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GRANT NUMBER DAMD17-94-J-4437

TITLE: Cancer Prevention and Control Research Manpower
Development

PRINCIPAL INVESTIGATOR: Samuel J. Shacks, M.D., Ph.D.

CONTRACTING ORGANIZATION: Drew University of Medical Science
Los Angeles, California 90059

REPORT DATE: October 1997

TYPE OF REPORT: Annual

PREPARED FOR: Commander
U.S. Army Medical Research and Materiel Command
Fort Detrick, Maryland 21702-5012

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<p>13. ABSTRACT (Maximum 200)</p> <p>The overall aim of this four-year project is to provide training in breast cancer prevention and control research for six fellows. Primary aims during year three were for third year fellows to submit manuscripts to peer reviewed journals and for each second year fellow to prepare a grant application for extramural funding. A major objective was to recruit a fellow in order to fill a position that was vacated during year two of the project.</p> <p>Our fellows are Sherry Crump, M.D., M.P.H., Mosunmola George-Taylor, Ph.D., Vanessa Parker, Ph.D., Carolyn Rowley, Ph.D. candidate, Ling Wu, Ph.D. and Kangman Zhu, M.D., Ph.D. Dr. Crump is being mentored by Beverly Taylor, MD at Morehouse School of Medicine. Dr. George-Taylor is being mentored by Linda Pederson, Ph.D. of Morehouse School of Medicine. Dr. Parker and Carolyn Rowley are being mentored by Susan Robinson, M.D., M.P.H. and Samuel Shacks, Ph.D., M.D. at Charles R. Drew University. Dr. Wu is working with Kofi Semenya, Ph.D. of Meharry Medical College. Dr. Zhu is being mentored by Robert Levine, M.D. of Meharry Medical College.</p> <p>The fellows have made measurable progress during year three. The third year fellows, Drs. Crump and Zhu prepared and submitted articles to peer-reviewed journals. One manuscript has been published. The second year fellows include Drs. George-Taylor, Parker, and Wu. Dr. Parker received funding for one project. Drs. George-Taylor and Wu are in the process of completing applications for extramural funding. Carolyn Rowley joined the project in June 1997. She filled a position that was vacated last year and is developing a research protocol.</p>				
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FOREWORD

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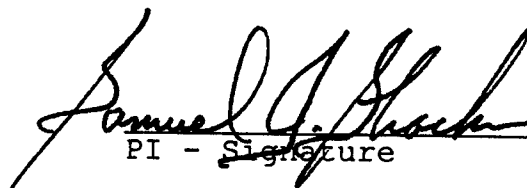

PI - Signature 10/27/97
Date

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- C. Dr. George-Taylor's research protocol and preliminary results
- D. Dr. Parker's
 - D1. Preliminary manuscript
 - D2. Research proposal
- E. Carolyn Rowley's literature review
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Introduction

Breast cancer is a leading cause of morbidity and mortality in American women. African-American women have higher mortality rates for this disease compared to white women. To address this issue, efforts to increase minority representation in cancer research have been made by the National Institute of Medicine. Success of these activities have been limited, and the pool of minority investigators remains small. The purpose of this project is to expand the pool of minority cancer control and prevention investigators. The overall aim of this four year study is to provide training in breast cancer prevention and control research for six post-doctoral graduates. The ultimate goal is to create independent investigators who will obtain extramural funding upon completion of the fellowship. The hypothesis to be tested is that with "protected time" and appropriate mentors, doctoral graduates in social science and public health disciplines can achieve independent extramural funding for breast cancer research within three years. Fellows are paired with faculty mentors from one of three Cancer Centers; Drew University of Medicine and Science in Los Angeles, California, Meharry Medical College in Nashville Tennessee and Morehouse School of Medicine in Atlanta Georgia.

Body

The overall aim of this four-year grant is to provide training in breast cancer research for six fellows. The primary aim of year three of the study was for third year fellows to submit manuscripts to peer reviewed journal and for second year fellows to develop grant applications. During year one of the project two fellows were recruited. Four fellows were recruited in year two. One fellow resigned in order to conduct prostate cancer research at another institution. A major objective in year three of the project was to recruit another student in order to fill a vacant position that resulted from the unexpected loss of a former fellow. Curriculum vitae of fellows and their mentors are in Appendix A. A description of each fellow's progress from October 1, 1996 until September 30, 1997 is summarized below.

Sherry Crump, M.D., M.P.H. is a preventive medicine physician who is being mentored by Beverly Taylor, MD, MPH at Morehouse School of Medicine. To date, Dr. Crump has completed three years of the fellowship. During year three of the grant, she prepared a manuscript titled, "Barriers to Screening Mammography Utilization Among Black Women at Grady Memorial Hospital" (See appendix B). Dr. Crump submitted the manuscript to a peer reviewed journal and is currently awaiting notification regarding the status of the document. She, also, received extramural funding from the Agency for Health Care Policy and Research for a breast health intervention study and presented results from her project at the American Public Health Association Meeting on November 19, 1996. She plans to continue working in cancer prevention and control at Morehouse School of Medicine.

Mosunmola George-Taylor, Ph.D., a cell biologist, has completed approximately 16 months of the fellowship. Linda Pederson, Ph.D. at Morehouse School of Medicine serves as her mentor. During year three of the grant, Dr. George-Taylor implemented a research project, "Electromagnetic Field Exposure and The Occurrence of Breast Cancer in Women". Due to unforeseen problems, her results are not available. However, a preliminary report is available (See Appendix C). Dr George-Taylor plans to apply for extramural funding soon.

Vanessa Parker, Ph.D., a preventive health researcher, has completed approximately 21 months of the fellowship. She is being mentored by Susan B. Robinson, M.D., M.P.H. and Samuel Shacks, Ph.D., M.D. at Charles R. Drew University. During this year, Dr. Parker was awarded extramural funding from the Los Angeles County Breast Cancer Early Detection Program to conduct a outreach intervention study. Results from her study were presented at a conference and have been prepared for publication as a brief report (See Appendix D1). In addition, Dr. Parker prepared a proposal titled " The Sexual Side Effects of Breast Cancer Treatments Among African-American Women (See Appendix D2). She submitted the proposal to the American Cancer Society. It was not funded. She intends to refine the proposal for resubmission. Dr. Parker is a board member of the American Cancer Society Unit in South-Central Los Angeles.

Carolyn Rowley, a Ph.D. candidate in psychology, is the most recent fellow. She joined the program in 1997, after a former fellow decided to pursue training in prostate cancer research at another institution. Susan B. Robinson, M.D., M.P.H. and Samuel Shacks, Ph.D., M.D. at Charles R. Drew University serve as her mentors. She is developing a research project regarding quality of life in African-American breast cancer survivors. She has completed the literature review and plans to implement her study in January 1998 (See Appendix E).

Ling Wu, Ph.D. has completed approximately two years of the fellowship. He is working with Kofi Semanya, Ph.D. at Meharry Medical College. During year three, he submitted a manuscript for publication to the Journal of National Medical Association (See Appendix F1). In addition, Dr. Wu is preparing another manuscript for publication (See Appendix F2). He is currently writing a proposal for extramural funding.

Kangman Zhu, MD, MPH, Ph.D. is an epidemiologist who is mentored by Robert Levine, M.D., M.P.H. at Meharry Medical College. Dr. Zhu has completed three years of the fellowship. During year three of the grant, Dr. Zhu implemented two research projects which were funded by the Department of Defense; " An Intervention Study on Screening for Breast Cancer Among Single African-American women Aged 65 and Older" and "Breast Cancer and Risk Factors Among African-American Women aged 20-54". In addition, his manuscript "Estrogen receptor status of breast cancer: a marker of different stages of tumor of different entities of the disease?" was published in Medical Hypotheses (See Appendix G). He is awaiting notification regarding publication of two other manuscripts. Dr. Zhu's career goals are to make significant contributions toward advancing the knowledge of breast cancer research. He intends to remain at Meharry Medical College.

All of the fellows, with the exception of Carolyn Rowley, presented their projects at the annual Consortium Cancer Center Symposium.

Conclusion

Year three of this grant has been highly productive. The third year fellows, Drs. Crump and Zhu have received extramural funding and are proceeding toward becoming independent investigators. Both intend to continue working in breast cancer research. This represents an increased in the number of minority investigators in cancer prevention and control research, which is the primary purpose of the grant. We anticipate similar success with the second year fellows. This year we recruited a fellow to replace the unexpected loss of a former student. It is anticipated that this fellow will, also, achieve success.

APPENDIX A

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel in the order listed on Form Page 2.
Photocopy this page or follow this format for each person.

NAME Sherry R. Crump, MD, MPH	POSITION TITLE Research Fellow
---	--

EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)			
INSTITUTION AND LOCATION	DEGREE (if applicable)	YEAR(s)	FIELD OF STUDY
University of Virginia, Charlottesville, VA	B.A.	1981-85	Biology
University of Virginia, Charlottesville, VA	M.D.	1985-91	Medicine
Carolina's Medical Center, Charlotte, NC		1991-92	Internship-Pediatrics
Morehouse School of Medicine, Atlanta, GA		1992-94	Residency-Prev. Med.
Rollins School of Public Health, Emory, Atlanta	MPH	1992-95	Public Health

RESEARCH AND PROFESSIONAL EXPERIENCE: Concluding with present position, list, in chronological order, previous employment, experience, and honors. Include present membership on any Federal Government public advisory committee. List, in chronological order, the titles, all authors, and complete references to all publications during the past three years and to representative earlier publications pertinent to this application. If the list of publications in the last three years exceeds two pages, select the most pertinent publications. **DO NOT EXCEED TWO PAGES.**

PROFESSIONAL EXPERIENCE:

1987-1988 Project Bayon-Volunteered in a hospital for indigent inhabitants of Honduras, Central America

1992-1993 Atlanta Public School for the Special Olympics Program - Volunteer Physician

1992-1994 Georgia Nurses' Foundation Health Care for the Homeless Program - Volunteer Program

1992-Present Fulton County Health Department Teen Service Program - Staff Physician

1994-Present Drew/Meharry/Morehouse Consortium Cancer Center - Breast Cancer Prevention and Control Research Fellowship

HONORS AND MEMBERSHIPS:

Summer '92 Treatment and Follow-up Compliance of Atlanta Soviet Refugees - Georgia Department of Human Resources, Office of Rural Health

Spring '93 Emory Undergraduate Student Sexual Behavior Survey - Rollins School of Public Health Emory University

Fall '93 Domestic Violence Survey - Georgia Department of Human Resources, Division of Public Health, Epidemiology Branch

Spring '94 Gonorrhea Trends - Richardson Health Center, STD Clinic, 1990-1993, Dekalb County Board of Health, Georgia

SELECTED PUBLICATION:

Crump, S.R. Promotion of Health Eating Habits in Children (letter to the editor) J Pediatric 1995; 126:850-851

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel in the order listed on Form Page 2.

Photocopy this page or follow this format for each person.

NAME Mosunmola Alaba George-Taylor		POSITION TITLE Assistant Professor	
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)</i>			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	YEAR(s)	FIELD OF STUDY
University of Lagos, Akoka, Lagos, Nigeria	B.S.	1975	Chemistry
Atlanta University, Atlanta, GA	M.S.	1982	Physical Chemistry
Georgia Institute of Technology, Atlanta, GA	M.S.	1987	Atmospheric Chemistry
Clark-Atlanta University, Atlanta, GA	Ph.D.	1994	Biology

RESEARCH AND PROFESSIONAL EXPERIENCE: Concluding with present position, list, in chronological order, previous employment, experience, and honors. Include present membership on any Federal Government public advisory committee. List, in chronological order, the titles, all authors, and complete references to all publications during the past three years and to representative earlier publications pertinent to this application. If the list of publications in the last three years exceeds two pages, select the most pertinent publications. DO NOT EXCEED TWO PAGES.

PROFESSIONAL EXPERIENCE:

1990-Present Assistant Professor, Chemistry Department, Clark Atlanta University, Atlanta, GA
 1991-1994 Research Technician, Department of Biological Sciences, Clark Atlanta University, Atlanta, GA
 1993-1994 Teaching Assistant, Clark Atlanta University, Atlanta, GA
 1991-1994 Biology and Chemistry Instructor, Clark Atlanta University summer programs
 1992-1993 Chemistry Lab Instructor, Spelman College, Atlanta, GA
 1991-1992 Science Instructor, Clark Atlanta University Weekend Programs Saturday Science Academy
 1992 Instructor of Hands on Laboratory Procedures in Physical Science
 Kindergarten through K8 Teachers in Atlanta Public School System.
 1988-1990 Research Assistant, Dolphus E. Milligan Science Research Institute, Clark Atlanta University
 Atlanta, GA
 1989 Laboratory Instructor, Chemistry Department, Clark Atlanta University, Atlanta, GA
 1982-1988 Research Assistant, School of Geophysical Sciences, Georgia Institute of Technology,
 Atlanta, GA
 1980-1982 Research Assistant, Chemistry Department, Atlanta University, Atlanta, GA
 1977-1980 Chemistry Teacher, Ikeja Grammar School, Oshodi, Lagos State, Nigeria
 1975-1976 Chemistry Teacher, Lagos City College, Yaba, Lagos State, Nigeria
 1972 Laboratory Technician, Lagos University Teaching Hospital, Idi-Araba, Lagos State, Nigeria

HONORS AND MEMBERSHIPS:

Member of the American Society of Cell Biology (ASCB)
 Member of the Federation of American Society of Experimental Biology (FASEB)

PROFESSIONAL CONFERENCES AND ACTIVITIES:

Drew-Meharry-Morehouse Cancer Consortium Symposium, Nashville, Tennessee, 1995
American Society of Cell Biologists Conference, San Francisco, California, 1994
American Society of Cell Biologists Conference, New Orleans, Louisiana, 1993
American Society of Cell Biologists Conference, Denver, Colorado, 1992
American Society of Cell Biologists Conference, Boston, Massachusetts, 1991
American Society of Cell Biologists Conference, San Diego, California, 1990
National MBRS (Minority Biomedical Research Symposia) Conference Atlanta, Georgia, 1993
National MBRS Conference, Washington, D.C., 1991
National MBRS Conference, Nashville, Tennessee, 1990
American Chemical Society 18th Regional Meeting, Bowling Green, Ohio, 1986

Successfully completed a short course on "Remote Sensing of the Earth and Atmosphere", conducted by the Department of Continuing Education, Georgia Institute of Technology, Atlanta, GA May 13-14, 1985

Successfully completed a short course on the "Introduction of the Problems of Acid Rain", conducted by the Department of Continuing Education, Georgia Institute of Technology, Atlanta, Ga November 7-10, 1984

SELECTED PUBLICATION:

Low Temperature Infrared Spectrum of Chlorine Nitrate and Evidence for the Existence of ClOONO. Journal of Physical Chemistry (1983), 87, 1091.

BIOGRAPHICAL SKETCH

Give the following information for the key personnel and consultants and collaborators. Begin with the principal investigator/program director. Photocopy this page for each person.

NAME	POSITION TITLE
Robert S. Levine	Co-Investigator

EDUCATION (Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)			
INSTITUTION AND LOCATION	DEGREE	YEAR CONFERRED	FIELD OF STUDY
Columbia University, NY, NY	B.A.	1963	Pre-Med.
Bowman Gray, Winston-Salem, NC	M.D.	1968	Medicine
Bowman Gray, Winston-Salem, NC	Intern	1969	Pediatrics
University of Kentucky, Lexington, KY	Resident	1972	Preventive Medicine

RESEARCH AND PROFESSIONAL EXPERIENCE: Concluding with present position, list, in chronological order, previous employment, experience, and honors. Key personnel include the principal investigator and any other individuals who participate in the scientific development or execution of the project. Key personnel typically will include all individuals with doctoral or other professional degrees, but in some projects will include individuals at the masters or baccalaureate level provided they contribute in a substantive way to the scientific development or execution of the project. Include present membership on any Federal Government public advisory committee. List, in chronological order, the titles, all authors, and complete references to all publications during the past three years and to representative earlier publications pertinent to this application. DO NOT EXCEED TWO PAGES.

Employment:

1972-74 Preventive Medicine Officer, Fort Hood, TX
 1974-76 Physician II, Dade Co. Health Dept., Miami, FL
 1976-86 Asst.-Associate Professor and Vice Chairman, Dept. of Epidemiology and Public Health, University of Miami, School of Medicine, Miami, FL
 1986-88 Director of Epidemiology and Biostatistics, Nassau Co. Dept. of Health, Mineola, NY
 1988-91 Director of Community and Preventive Medicine, Our Lady of Mercy Medical Center, Bronx, NY
 1991 Associate Medical Director, Quality Assurance, Kings Co. Hospital Center, Brooklyn, NY
 1992-Present Professor, Department of Family and Preventive Medicine, Meharry Medical College, Nashville, TN
 1993-Present Principal Investigator, MEDTEP Research Center,
 Associate Director for Research, Institute on Health Care for the Poor and Underserved,
 Chair, Editorial Board of Journal of Health Care for the Poor and Underserved, Meharry, Medical College,
 Interim Chair, Department of Family and Preventive Medicine, Meharry Medical College, Nashville, TN

Honors and Awards:

1972 Army Commendation Medal
 1975 Fellow, American College of Preventive Medicine
 1988 Member, American College of Epidemiology

Publications: (1990-Present)

- Report of a WHO/UNEP Working Group. Public Health Impact of Pesticides Used in Agriculture. Geneva and Nairobi: WHO/UNEP. 1990.
- Zeigler RG, Brinton LA, Warnecke R, Hamman RA, Lehman H, Levine RS, Stolley P, Rosenthal AC, Trumbell AC, Hoover RN. "Diet and the Risk of Invasive Cervical Cancer Among White Women in the United States." Amer J Epidemiol. 132:432-445 1990.
- Levine RS, Hersh CB, Hodder RA. "Historical Patterns of Pesticide Epidemiology Research." Epidemiology. 1:181-184. 1990.
- Jones CJ, Brinton LA, Hamman RF, Stolley PD, Lehman HF, Levine RS. "Risk Factors for In Situ Cervical Cancer: Results from a Case-control Study." Cancer Research 50:3657-3662. 1990.
- Hidesheim, A, Brinton LA, Mallin K, Lehman HF, Savitz DA, Levine RS. "Barrier and Spermicidal Contraceptive Methods and Risk of Invasive Cervical Cancer." Epidemiology. 1:266-272. 1990.
- 6-8. The Selected Cancers Cooperative Study Group. The Association of selected cancers with service in the US military in Vietnam. I. Non-Hodgkin's Lymphoma; II. Soft Tissue and Other Sarcomas; III. Hodgkin's Disease, Nasal Cancer, and Nasopharyngeal Cancer. Arch. Intern Med. 150:2473-83; 2492-95; 2495-2505. 1990

Biographical Sketch: Robert S. Levine, M.D. (Page 2)

9. Levine RS. "Recognized and Possible Effects of Pesticides in Humans." Chapter 7 of Hayes WJ Jr., and Walls EN. Handbook of Pesticide Toxicology. Vol. I. San Diego: Academic Press. 1991. pp. 275-360.
10. Zeigler RG, Jones CJ, Brinton LA, Norman SA, Mallin K, Levine RS, Lehman HF, Hamman RF, Tremble AC, Rosenthal J, Hoover RN. "Diet and Risk of In Situ Cervical Cancer Among White Women in the United States." Cancer Causes and Control. 2:17-29. 1991.
11. Lassiase DH, Savitz DA, Hamman RF, Baron AE, Brinton LA, Levine RS. "Invasive Cervical Cancer and Intrauterine Device Use." Int.J.Epidemiol. 20:865-70. 1991.
12. Levine RS and Doull J. "Global Estimates of Pesticide Mortality and Morbidity." Rev.Env.Contam.and Toxicol. 129:29-50. 1992.
13. Levine RS and Dolin P. "Pregnancy and Breast Cancer: A Possible Explanation for the Negative Association." J.Med.Hypoth. 38:278-283. 1992.
14. Levine, RS, Hennekens, CH, Jesse, MJ. Development of Blood Pressure in a Population-Based Cohort of Newborn Twins. BMJ. 1994; 308:298-302.
15. Levine, RS. "Practicing Without a Net." TIKKUN, Sep/Oct, 1995:65-73.
16. Levine, RS, Zhu, K, Braun, E, Baum, M, Gnepp, D. "Population-based Case Control Study of the Relationship Between Cigarette Smoking and Nasal Naso-pharyngeal Cancer." Cancer Causes & Control. In press.

Abstracts and Presentations (*Presented): 1990 to Present

- *1. Fojas, A, Feldman, G, Hauben, M, Levine, R, Hodder, R, Marino, W. The Effect of Increased Attending supervision and Educational Intervention on the Practice of Influenza Vaccination by Medical Residents on Hospital Outpatients. Am. Rev.Resp. Dis. 141:A603. 1990.
2. Futterman, N, Zervis, G, Inba-Vazhau, G, Gupta, V, Levine RS, Hodder, RA, Ciaramida, SA. Near Misses in Thromboembolytic Therapy: The Need for Timely Delivery. Clin. Res. 38:703A. 1990.
- *3. Levine, RS and Dolin, P. Halogenated Hydrocarbons and Human Cancer: A Reconsideration. International Society for Environmental Epidemiology. Buffalo, NY. June, 1991.
- *4. Levine, RS, Kazi, I, Dolin, P, Futterman, N, Marino, W, Hodder, RA. Towards the Integration of Curative and Preventive Services for Internal Medicine Patients. American Public Health Association. Atlanta, GA. November, 1991. Abstracts:253.
- *5. Levine, RS, Kazi, I, Dolin, P, Futterman, N, Marino, W, Hodder, RA. Integrating maternal preventive services at a well baby clinic. American Public Health Association. Abstracts:236.
- *6. Levine, RS, Doull, J. Global Estimates of Pesticide Mortality and Morbidity. American Chemical Society. San Francisco, CA. 1992.
- *7. Levine, RS. Medical effectiveness and quality assurance. Invited Lecture. Uniformed Services University of the Health Sciences. June 1993.
- *8. Torres, T, Levine, RS, Carter, R. Intervention to increase the proportion of patients whose physicians advise regular physical activity. Prevention 94. Atlanta, GA. 1994.
9. Apollis, K, Nelson-Knuckles, B, Tate, H, Levine, RS. A family systems approach to the management of hypertension in African-Americans. Accepted for presentation. National Medical Association. August, 1994.
10. Turner, EA, Levine, RS, Federspiel, CF, Nelson-Knuckles, B, Wolff, S. Pharmacy payments for sickle cell diseases: Increases from 1980 to 1992. Submitted for presentation to APHA 123rd Annual Meeting, San Diego, CA. October, 1995.
- *11. Levine, RS, Zhu, K, Braun, E, Baum, M, Gnepp, D. Population-based Case Control Study of the Relationship Between Cigarette Smoking and Nasal Naso-pharyngeal Cancer. Society of Epidemiological Research, Snowbird, UT. June, 1995.
12. Levine, RS, Zhu, K, Braun, E, Baum, M, Gnepp, D. Population-based Case Control Study of the Relationship Between Cigarette Smoking and Nasal Naso-pharyngeal Cancer. Am.J.of Epid. 131:S41, 1995.
- *13. Zhu, K and Levine, RS. Population-based Case Control Study of the Relationship Between Cigarette Smoking and Liver Cancer, Society of Epidemiological Research, Snowbird, UT. June, 1995.
14. Levine, RS, Zhu, K, Braun, E, Baum, M, Gnepp, D. Population-based Case Control Study of the Relationship Between Cigarette Smoking and Primary Hepatic Cancer. Am.J.of Epid. 131:S61, 1995.

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel in the order listed on Form Page 2.
Photocopy this page or follow this format for each person.

NAME Vanessa C. Parker		POSITION TITLE Department of Preventive Medicine	
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)</i>			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	YEAR(s)	FIELD OF STUDY
University of California - Sand Diego, San Diego, CA	B.S.	1982	Microbiology
California State University, Dominguez Hills, CA	M.A.	1989	Behavioral Sciences
University of Southern California	Ph.D.	1995	Preventive Medicine

RESEARCH AND PROFESSIONAL EXPERIENCE: Concluding with present position, list, in chronological order, previous employment, experience, and honors. Include present membership on any Federal Government public advisory committee. List, in chronological order, the titles, all authors, and complete references to all publications during the past three years and to representative earlier publications pertinent to this application. If the list of publications in the last three years exceeds two pages, select the most pertinent publications. DO NOT EXCEED TWO PAGES.

PROFESSIONAL EXPERIENCE:

- 11/93-Present Graduate Research Assistant, Drug Use and HIV-Risk Sexual Behaviors in Homeless Youth, Childrens Hospital Los Angeles, Division of Adolescent Medicine
- 07/93-Present Co-Principal Investigator, Adolescent Condom-Use Efficacy Among Urban Minorities, Charles R. Drew University of Medicine and Science
- 05/93-12/93 Project Manager, Gang Violence Prevention and Suppression Project, High-Risk Youth Project, Childrens Hospital-Division of Adolescent Medicine
- 06/92-12/93 Graduate Research Assistant, KCET/USC African American Smoking Prevention Project, University of Southern California
- 06/92-10/93 Sr. Research Associate, Women & HIV/AIDS Research Project, Charles R. Drew University of Medicine and Science
- 09/91-06/92 Graduate Research Assistant, Day One Community Partnership, University of Southern California
- 09/90-06/92 Program Manager, Tobacco Control Program, King-Drew Medical Center, Los Angeles, California
- 12/88-01/91 Staff Research Associate, California Heterosexual Partner Study, University of California, San Francisco
- 10/88-11/89 Program Manager, People Who Care Youth Center AIDS Education Project, Los Angeles, California
- 02/88-11/88 Medical Assistant Instructor, Watterson Career College, Los Angeles, California
- 05/88-09-88 Peer Ethnographic Interviewer, California State University, Long Beach, AIDS Education and Prevention Project, Long Beach, California
- 08/87-08/88 Minority Aids Educator, Long Beach Health Department, Aids Education and Prevention Project, Long Beach, California
- 06/86-09/87 Research Assistant, Cancer Research Consortium, Charles R. Drew University of Medicine and Science, Los Angeles, California
- 10/84-11/85 Medical Consultant, W.E. Thompson and Associates, Attorneys-at-Law, Washington, D.C.

HONORS AND MEMBERSHIPS:

Distinguished Young Women of America, 1987

Certificate of Appreciation, County of Los Angeles, Department of Health Services, Sexually Transmitted Disease Program, November 1989

Certificate of Appreciation, Los Angeles Southwest College Women's Center, October 1989

Certificate of Appreciation, County of Los Angeles, Department of Health Services, Sexually Transmitted Disease Program

SELECTED PUBLICATIONS:

1. Sussman, S., Parker, V., Crippens, D., Scholl, D., Elder P. "Empirical Development of Brief Smoking Prevention Videotapes Which Target African American Adolescents". International Journal of Addictions 1995;30(9):1141-1164.
2. Rohrbach, L., Fishkin, S., Mansergh, G., Parker, V., Johnson, C.A. "A Survey of Substance Use and Related Issues in Pasadena and Altadena, California". Technical Report, August 1994.
3. Parker, V., Montgomery, S., Kipe, MD, O'Guynn, S. "Tracking Homeless/Runaway Youth", Technical Report, March 1995.
4. Parker, V., Sussman, S., Herring, D., Crippens, D., et al. "Qualitative Development of Smoking Prevention Programming for Minority Youth" (Under Review)
5. Parker V., Sussman, S., "Cigarette Smoking Among Family and Friends of Urban African American Youth" (Under Review)
6. Parker, V., Sussman, S., Herring, D., Crippens, D., et al. "The relations of Ethnic Identification With Smoking Among Ethnic Minority Youth" (Under Review)
7. Parker, V., Montgomery, S., Kipke, M., O'Guynn, S., "Longitudinal Follow-up of Urban Homeless/Runaway Youth: Methodology" (In Preparation)
8. Parker, V., Ashley, M., Montgomery, S., "Sexual and Condom Use Behaviors Among African American Adolescents Living In An Inner-City Public Housing Development" (In Preparation)
9. Parker, V., Rabinovitz, S., Kipke, M., "The Practice of Violence Among Urban Homeless/Runaway Youth" (In Preparation)

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel in the order listed on Form Page 2.

Photocopy this page or follow this format for each person.

NAME		POSITION TITLE	
Linda Lue Pederson		Professor, Department of Epidemiology & Biostatistics	
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)</i>			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	YEAR(s)	FIELD OF STUDY
Brown University	B.A.	1964	Psychology
University of Iowa	M.A.	1966	Child Behavior
University Western Ontario	Ph.D.	1980	Epidemiology & Biostatistics

RESEARCH AND PROFESSIONAL EXPERIENCE: Concluding with present position, list, in chronological order, previous employment, experience, and honors. Include present membership on any Federal Government public advisory committee. List, in chronological order, the titles, all authors, and complete references to all publications during the past three years and to representative earlier publications pertinent to this application. If the list of publications in the last three years exceeds two pages, select the most pertinent publications. **DO NOT EXCEED TWO PAGES.**

PROFESSIONAL EXPERIENCE:

1994-Present Clinical Professor, Community Health & Preventive Medicine, Morehouse School of Medicine, Atlanta, GA

1994-1995 Professor, Epidemiology & Biostatistics, University of Western Ontario

1986-1991 Associate Director, Health Care Research Unit, University of Western Ontario

1984-1993 Associate Professor, Medicine, University of Western Ontario

1984-1994 Associate Professor, Epidemiology & Biostatistics, University of Western Ontario

1980-1984 Assistant Professor, Epidemiology & Biostatistics, University of Western Ontario

1980-1984 Assistant Professor, Medicine, University of Western Ontario

1979-1980 Research Associate, Medicine, Victoria Hospital/ University of Western Ontario

Winter 78 Teaching Assistant, Biostatistics II, Epidemiology & Preventive Medicine, University of Western Ontario

Fall 78 Teaching Assistant, Biostatistics I, Epidemiology & Preventive Medicine, University of Western Ontario

1973-1976 Research Assistant, Medicine, University of Western Ontario
Programmer Coordinator, Smoking Withdrawal Program, Victoria Hospital
Research Assistant, London Board of Education

1968-1975 Grader, Introductory Psychology Course, Psychology, Correspondence Division, University of Western Ontario

1968-1973 Consultant, Psychology, University of Western Ontario

1968-1973 Teaching Developmental Psychology, Extension & Summer School, University of Western Ontario

Oct. 1966- Research Associate, Psychology, London Psychiatric Hospital

May 1967

1964-1966 Research Assistant, Institute of Child Behavior & Development, University of Iowa

1963-1964 National Science Foundation Undergraduate Research Fellowship, Psychology, Brown University

HONORS AND MEMBERSHIPS:

Fellow, American College of Epidemiology, 1986

Member, Centre for Activity and Ageing, Lawson Research Institute of the St. Joseph's Health Centre and University of Western Ontario, 1993

Associate Member, Centre for Health Promotion, Banting Institute, University of Toronto, 1993-95

Steering Committee, "Working women's work-related health concerns survey", Industrial Disease Standards Panel, 1993

Board of Directors, Canadian Society for Epidemiology and Biostatistics, 1993

Reviewer, University of Toronto Press, 1992

Member, Advisory Board, Annals on Addiction; Journal published by the Publications Service of the University of Granada (Spain), 1992

Member, Editorial Board, Health Values, 1992

Advisory Board, Outcome Research for Independent Health Facilities, College of Physicians & Surgeons of Ontario, 1992

Advisory Board, Canadian Consensus on Physicians Intervention in Smoking Cessation, 1991

Member, Selection Committee for Chair, Department of Epidemiology & Biostatistics, University of Western Ontario, 1991

Member, Health Care Systems Review Committee, panel A., Ontario Ministry of Health, 1991-93

Coordinator, Department of Epidemiology & Biostatistics Seminar Services, 1990

Member-at-large, national Cancer Institute of Canada, 1990-98

Member, Ontario Health promotion Researchers and Practitioners Network Project Meeting, Ontario Prevention Clearinghouse Advisory Committee, June 4, 1990

Host, Ontario Health Promotion Researchers and Practitioners Workshop, Ontario prevention Clearinghouse, May 3, 1990

Member, Workshop on Health Promotion Research, Ontario Prevention Clearinghouse Advisory Committee, 1990

Member, Editorial Board, Women and health, 1989

Planning Committee, Adolescent Smoking Survey, Health and Welfare Canada, 1989-91

SELECTED PUBLICATIONS:

1. Ashley, M.J., Bull, S.B. and Pederson, L.L. Support among smokers and nonsmokers for restrictions on smoking. American Journal of Preventive Medicine, 1995 (in press).
2. Ostbye, T., Pomerleau, J., Speechley, M., Pederson, L.L. and Speechley, K. Correlates of body mass index in the 1990 Ontario Health Survey. Canadian Medical Association Journal, 1995, 152(11), 1811-1817.
3. Helmes, E., Hodsman, A., Lazowski, D., Bhardwaj, A., Crilly, R., Nichol, P., Drost, D., Vanderburgh, L. and Pederson, L. A questionnaire to evaluate disability in osteoporotic patients with vertebral compression fractures. Journal of Gerontology: Medical Sciences, 1995, 50A(2), M91-M98.
4. Bull, S.B., Pederson, L.L. and Ashley, M.J. Restrictions on smoking: Growth in population support between 1983 and 1991 in Ontario, Canada. Journal of Public Health Policy, 1994, 15(3), 310-328.
5. Bull, S.B., Pederson, L.L. and Ashley, M.J. Relationship of smoking status to changes in knowledge and attitudes concerning restrictions on smoking. Canadian Journal of Public Health, 1994, 85(2), 103-105.
6. Pederson, L.L., Bull, S.B., Ashley, M.J., Garcia, J.M. and Lefcoe, N.M. An evaluation of the work place smoking bylaw in the City of Toronto. American Journal of Public Health, 1993, 83(9), 1342-1345.
7. Turner, L.A., Pederson, L.L. and Ostbye, T. Health work force planning in the 90's, Part II: Enough in the right place at the right time? Healthcare Management Forum, 1993, 6(2), 23-30.
8. Turner, L., Ostbye, T. and Pederson, L.L. Work force planning in the 90's, Part I: Efficiency, economy and political will - the need for a new approach. Healthcare Management Forum, 1993, 6(1), 34-40.
9. Pederson, L.L., Bull, S.B., Ashley, M.J. and Kozma, D. Restrictions on smoking: Changes in knowledge, attitudes and predicted behavior in Metropolitan Toronto from 1983 to 1988. Canadian Journal of Public Health, 1992, 83(6), 408-412.
10. Pederson, L.L., Poulin, M., Lefcoe, N.M., Donald, A.W. and Hill, J.S. Does cigarette smoking affect the fitness of young adults?: Rationale and protocol for future research. The Journal of Sports Medicine and Physical Fitness, March 1992, 32(1), 96-105.

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel in the order listed on Form Page 2.
Photocopy this page or follow this format for each person.

NAME Carolyn Rowley		POSITION TITLE Post-doctoral Fellow	
EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)			
INSTITUTION AND LOCATION	DEGREE (if applicable)	YEAR(s)	FIELD OF STUDY
Loyola Marymount University, California	B.A.	1983	Psychology
Loyola Marymount University, California	M.A.	1988	Counseling Psychology
Southern Illinois University at Carbondale, Illinois	M.A.	1990	Clinical Psychology
Southern Illinois University at Carbondale, Illinois	Ph.D.	In Progress	Clinical Psychology

RESEARCH AND PROFESSIONAL EXPERIENCE: Concluding with present position, list, in chronological order, previous employment, experience, and honors. Include present membership on any Federal Government public advisory committee. List, in chronological order, the titles, all authors, and complete references to all publications during the past three years and to representative earlier publications pertinent to this application. If the list of publications in the last three years exceeds two pages, select the most pertinent publications. **DO NOT EXCEED TWO PAGES.**

PROFESSIONAL EXPERIENCE:

8/88 - 5/89 Teaching Assistant, Southern Illinois University at Carbondale:
Carbondale, Illinois

6/89 - 5/90 Psychology Instructor, Southern Illinois University at Carbondale:
Carbondale, Illinois

8/90 - 8/91 Undergraduate Psychology Advisor, Southern Illinois University at
Carbondale: Carbondale, Illinois

9/91 - 5/92 Director of Psychology Undergraduate Studies/Psychology Instructor,
Southern Illinois University at Carbondale: Carbondale, Illinois

9/92 - 5/93 Psychology Instructor, Southern Illinois University at Carbondale:
Carbondale, Illinois

9/93 - 8/94 Pre-doctoral Internship, University of Louisville School of Medicine:
Louisville, Kentucky

9/94 - 11/95 Associate Psychologist, Wayne and Associates: Louisville, Kentucky

1/96 - 5/97 Consulting Psychologist/Independent Contractor: Beverly Hills,
California

6/97 - Present Post-doctoral Research Fellow, Department of Research Training and
the Drew component of the Drew-Meharry-Morehouse Consortium
Cancer Center: Los Angeles, California

RESEARCH EXPERIENCE:

Sickle Cell Anemia
Infant Neurodevelopment and language acquisition
Deviant sexual behavior and group therapy

HONORS:

Psi Chi Honor Society: Loyola Marymount University, Los Angeles, California (1983)
Roby Honoree for Academics: Southern Illinois University at Carbondale: Carbondale,
Illinois (1992)

PAPER/POSTER PRESENTATIONS:

- Rowley, C. (March, 1997). Sickle Cell Disease Research Foundation, Los Angeles, California
"Emotional Stress/Coping Strategies for Parents"
- Rowley, C. (July, 1996). Sickle Cell Disease Research Foundation, Los Angeles, California
"Strategies for Coping with Emotional Stress and Sickle Cell Disease"
- McIntyre, D.J., Mitchell, T.O., Landrum, R.E., & Rowley, C. (1993, February). Ready or not?
Preservice microteaching for TAs. Video presented at Association of Teacher Educators
 73rd Annual Meeting, Los Angeles, California
- Rowley, C. (1991, April). Suicide ideation and depression in chronically ill children:
A study of children and adolescents with sickle cell anemia. Poster presented at the
 Third Florida Conference on Child Health Psychology, Gainesville, Florida
- Rowley, C., & Gilbert, B.O. (1991, May). Suicide ideation and depression in chronically
ill children: A study of children and adolescents with sickle cell anemia. Paper
 presented at the Midwest Psychological Association, Chicago, Illinois

PROFESSIONAL ORGANIZATIONS:

- Student Member, American Association of Suicidology
 Student Member, American Psychological Association
 American Psychological Association of Graduate Students
 Student Member, American Psychological Association, Section 1, Division 12
 Student Member, Association of Black Psychologist
 Psi Chi Honor Society
 Sigma Xi, The Scientific Research Society
 Society of Pediatric Psychology

CONTINUATION PAGE: STAY WITHIN MARGINS INDICATED

BIOGRAPHICAL SKETCH

NAME	POSITION TITLE
SUSAN ROBINSON, MD, MPH	PHYSICIAN

EDUCATION (Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)

INSTITUTION AND LOCATION	DEGREE	YEAR CONFERRED	FIELD OF STUDY
Dillard University; New Orleans, LA	BS	1985	Chemistry
University of Pittsburgh; Pittsburgh, PA	M.D.	1990	Medicine
Loma Linda Uni. School of Public Health; Loma Linda CA	M.P.H	1993	Occupational/Epidemiology
Loma Linda University Medical Center; Loma Linda, CA	Residency	1993	Preventive Medicine
Drew University School of Medicine; Los Angeles, CA	Fellowship	1994	Cancer Prevention Research

RESEARCH AND PROFESSIONAL EXPERIENCE: Concluding with present position, list, in chronological order, previous employment, experience, and honors. Key personnel include the principal investigator and any other individuals who participate in the scientific development or execution of the project. Key personnel typically will include all individuals with doctoral or other professional degrees but in some projects will include individuals at the masters or baccalaureate level provided they contribute in a substantive way to the scientific development or execution of the project. Include present membership on any Federal Government public advisory committee. List, in chronological order, the titles, all authors, and complete references to all publications during the past three years and to representative earlier publications pertinent to this application. DO NOT EXCEED TWO PAGES.

PROFESSIONAL EXPERIENCE

1993-present Assistant Professor in Department of Internal Medicine at Charles R. Drew University

RESEARCH EXPERIENCE

1991-1993 Research Associate, "Bupropion as an Adjunct to Smoking Cessation" Principal Investigator, Lindy Ferry M.D., M.P.H., Loma Linda University Medical Center

1992-1994 Research Associate, "Dopamine Receptors in Nicotine Addiction", Principal Investigator, David Comings, M.D., City of Hope Medical Center

1995-1996 Co-Investigator, "Cancer Prevention and Control in Underserved Populations", Principal Investigator Mary Ashley RN, Drew University

1995-1997 Co-Investigator, "Cancer Fatigue and Quality of Life," Principal Investigator, Marcia Grant Ph.D., City of Hope Medical Center

1996-present Co-Principal Investigator, "Cancer Prevention and Control Manpower Development", Principal Investigator, Samuel Shacks, Ph.D., M.D., Drew University

1997-2000 Principal Investigator, "Using Breast Cancer Survivors to Increase Mammography Use", Department of Defense

PUBLICATIONS

Bradshaw S, Comings DE, and Ferry LH. "Dopamine Receptors in Nicotine Addiction". Journal of Addictive Diseases. 1993; 12 (4): 174.

Robinson S, Ashley M and Haynes A. "Attitudes Among African-Americans Regarding Prostate Cancer Screening Trails," JNMA. 1996;88(4):241-248.

Robinson S, Ashley M. and Haynes A. "Attitudes Regarding Participation in Prostate Cancer Clinical Trials Among African-Americans", J Comm Health. 1996; 21(2): 77-87.

Ashley M. **Robinson S**. and Haynes MA. "Determinants of Participation in Prevention Trials" Accepted with Revisions.

Bastani R, Yancey A, Maxwell A, and **Robinson S**. "Prostate Cancer Screening Behavior Among African Americans" Unpublished.

Wu L, Semanya K, Hardy R, Hargreaves M, **Robinson S**, Pederson L, and Sung J., "Cancer Rate Differentials Between Blacks and Whites : A Ten Year Comparison" Submitted for publication.

Grant M, Anderson P, Ashley M, Padilla, **Robinson S** etc. "Fatigue and Quality of Life: A Multicultural Approach." Submitted for publication

PRESENTATIONS

1997 Advances in Smoking Cessation, Asian-American Medical Association in Los Angeles, CA
1997 Prostate Cancer Screening at American Association Cancer Research in San Diego on April 12-16, 1997
1997 "Prostate cancer" Grace United Methodist Church in Los Angeles
1996 "Recruitment strategies for African-Americans" Cancer Prevention and Control Research Workshop sponsored by The Jonsson Comprehensive Cancer Center at UCLA.
1995 "Reducing breast cancer mortality in women" Sixth annual Women's conference at Lynwood's City of Hall.
1994 "Prostate cancer in African-Americans" 22nd Annual Training Conference for The California Association of Black Correctional Workers

HONORS

1994 Young Investigator Award in Nicotine Addiction award by American Society of Addiction Medicine

SOCIETIES

1993-1995 Delegate, California Medical Association
1994-present Board Member, Encore Plus Program
1994-present Young Physician Section, California Academy of Preventive Medicine
1994-present Program Coordinator, American College of Preventive Medicine
1996-present Board Member, American Cancer Society-South Central Los Angeles Unit

BIOGRAPHICAL SKETCH

Give the following information for the key personnel and consultants and collaborators. Begin with the principal investigator/program director. Photocopy this page for each person.

NAME Kofi Alavi Semenya		POSITION TITLE ASSOCIATE DIRECTOR	
EDUCATION (Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)			
INSTITUTION AND LOCATION	DEGREE	YEAR CONFERRED	FIELD OF STUDY
University of Ghana, Legon, Ghana	B.S.	1971	Math & Physics
University of Ghana, Legon, Ghana	M.S.	1974	Statistics & Demographics
University of North Carolina	Ph.D	1980	Biostatistics

RESEARCH AND PROFESSIONAL EXPERIENCE: Concluding with present position, list, in chronological order, previous employment, experience, and honors. Key personnel include the principal investigator and any other individuals who participate in the scientific development or execution of the project. Key personnel typically will include all individuals with doctoral or other professional degrees, but in some projects will include individuals at the masters or baccalaureate level provided they contribute in a substantive way to the scientific development or execution of the project. Include present membership on any Federal Government public advisory committee. List, in chronological order, the titles, all authors, and complete references to all publications during the past three years and representative earlier publications pertinent to this application. DO NOT EXCEED TWO PAGES.

EXPERIENCE

1980 -1982 Assistant Professor of Biostatistics, Meharry Medical College, School of Medicine

1982 - 1986 Consultant in Biostatistics and Part-time Faculty Member, Meharry Medical College, SOM

1982 - 1986 Assistant Professor of Statistics, Department of Physics, Mathematics and Computer Science, Tennessee State University, Nashville, TN

1987 - Present Associate Professor of Biostatistics, Cancer Control Research Unit and Department of Preventive and Community Dentistry, Meharry Medical College, Nashville, TN

HONORS AND MEMBERSHIPS

- Sigma Xi Scientific Society
- American Statistical Association
- Biometric Society
- Population Association of America

PUBLICATIONS

Koch, G.G., Grizzle, J.E., Semenya, K.A., and Sen, P.K. Statistical Methods for the Evaluation of Mastitis Treatment Data. Journal of Dairy Science, Vol. 61, No.6., 1987.

Semenya, K.A., Koch, G.G. Linear Models Analysis for Rank Functions of Ordinal Categorical Data. Proceedings of the Statistical Computing Section of the American Statistical Association, 1979.

Semenya, K.A., Koch, G.G. Compound Function and Linear Model Methods for the Multivariate Analysis of Ordinal Categorical

Data. Institute of Statistics, Mimeo Series, No. 1323, UNC, Chapel Hill, NC., 1980.

Semenya, K.A., Koch, G.G. A Weighted Least Squares Strategy for Comparison of Populations Based on Grouped Survival Data. American Statistical Association - Proceedings of the Statistical Computing Section, 1981.

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel in the order listed on Form Page 2.

Photocopy this page or follow this format for each person.

NAME		POSITION TITLE	
Samuel J. Shacks, Ph.D., M.D.		Associate Professor	
EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)			
INSTITUTION AND LOCATION	DEGREE (if applicable)	YEAR(s)	FIELD OF STUDY
Arkansas State AM&N College, Pine Bluff, Ark.	B.S.	1960	Biology Chemistry
University of California, Irvine, CA	Ph.D.	1972	Biology
University of California, Irvine, CA	M.D.	1977	Medicine
Harbor/UCLA Medical Center, Torrance, CA	Fellowship	1981-83	Immuno/Allergy

RESEARCH AND PROFESSIONAL EXPERIENCE: Concluding with present position, list, in chronological order, previous employment, experience, and honors. Include present membership on any Federal Government public advisory committee. List, in chronological order, the titles, all authors, and complete references to all publications during the past three years and to representative earlier publications pertinent to this application. If the list of publications in the last three years exceeds two pages, select the most pertinent publications. **DO NOT EXCEED TWO PAGES.**

Appointments/Positions:

1972-1973 Research Fellow, Medicine, Robert B. Brigham Hospital, Harvard Medical School, Boston, Massachusetts.

1973-1974 Research Fellow in Immunology, Department of Microbiology and Immunology, University of California, Los Angeles, School of Medicine.

1977-1980 Pediatrics Residency, Martin Luther King, Jr. General Hospital, Los Angeles, California.

1980-1992 Assistant Professor, Charles R. Drew University of Medicine and Science, Martin Luther King, Jr., General Hospital, Department of Pediatrics, Los Angeles, California.

1981-1983 MARC Faculty Fellowship in Pediatric Immunology, Division of Immunology and Allergy, Harbor-UCLA Medical Center, Torrance, California.

1991-Present Chief, Pediatric Immunology/Rheumatology, Department of Pediatrics, King/Drew Medical Center, Los Angeles, California.

1992-1995 Associate Professor I, Charles R. Drew University of Medicine and Science, Martin Luther King, Jr., General Hospital, Department of Pediatrics, Los Angeles, California.

1995-Present Associate Professor II, Charles R. Drew University of Medicine and Science, Martin Luther King, Jr., General Hospital, Department of Pediatrics, Los Angeles, California.

Experiences:

1983-1987 MARC Review Committee, NIH/NIGMS, Bethesda, Maryland.

1984-1997 Director, MARC Program, Charles R. Drew University of Medicine & Science, Los Angeles, California.

1984-Present Director, MBRS Program, Charles R. Drew University of Medicine & Science, Los Angeles, California.

1986-1996 Comprehensive Sickle Cell Centers Parent Review Committee, NIH/NHLBI, Bethesda, Maryland.

1987-1992 Associate Dean for Research, Charles R. Drew University of Medicine and Science, Los Angeles, California.

1987-Present Association of Minority Health Professions Schools (AMHPS), Washington, D.C.

1987-1992 Liaison/Coordinator for AMHPS/NIH Initiatives, National Cancer Institute, National Institutes of Health, Bethesda, Maryland.

1987-Present Liaison Officer, Department of Defense, National Association for Equal Opportunity in Higher Education, Washington, D.C.

1989 Their Committee: State of the Nation's Health Research Facilities Infrastructure, National Academy of Science, Washington, D.C.

- 1990-1997 Consumer Representative, Immunology Devices Panel Food & Drug Administration, Rockville, Maryland.
- 1990-1991 Member, Sickle Cell Disease Task Force for the National Health, Lung, and Blood Institute (NHLBI) National Institutes of Health, Bethesda, Maryland.
- 1990-Present Member, Executive Board of Directors, National Cancer Control Research Network, Inc., National Cancer Institute, NIH, Bethesda, Maryland.
- 1990-1991 Partnership Member, NSF-Alliances for Minority Participation Program, California State University Dominguez Hills, Los Angeles, California (Planning Grant).
- 1990-1991 Member, Health Technology Study Section, Agency for Health Care Policy and Research/DHHS/PHS, Rockville, Maryland.

Honors:

- 1989 Chair, Research Group, Association of Minority Health Professions Schools, Washington, D.C.

Publications:

1. Granger, G.A., Shacks, S.J., Williams, T.W. and Kolb, W.P.: Lymphocyte In Vitro Cytotoxicity; Specific Release of Lymphotoxin like Materials from Tuberculin Sensitive Lymphoid Cells. *Nature* 211:115-7, 1969.
2. Shacks, S.J. and Granger, G.A.: Studies on In Vitro Models of Cellular Immunity. *J. Reticulonendoth. Soc.* 10:28-49, 1971.
3. Shacks, S.J., Chiller, J. and Granger, G.A.: The In Vitro Role of Thymus Dependent Cells in DNA Synthesis and LT Secretion by PHA-Stimulated Mouse Lymphoid Cells. *Transpl. Proceed* 4:303-7, 1972.
4. Shacks, S.J., Chiller, J. and Granger, G.A.: Studies on In Vitro Models of Cellular Immunity: The Role of T and B Cells in the Secretion of Lymphotoxin. *Cellular Immunol.* 7:313-21, 1973.
5. Brosman, S., Hausman, M. and Shacks, S.J.: Studies on the Immune Status of Patients with Renal Adenocarcinoma. *Jour. Urol.* 114:373-80, 1975.
6. Brosman, S., Hausman, M. and Shacks, S.J.: Immunologic Alterations in Patients with Prostatic Carcinoma. *Jour. Urol.* 113:841-45, 1975.
7. Shacks, S.J. and Heiner, D.C.: Allergy to Breast Milk. *Clinics in Immunol. and Allergy.* 2(1):121, 1982.
8. Alfred, L.J., Ghoneum, M., Wojdani, A. and Shacks, S.J.: Alterations in NK Activity and T-Cell Subsets During the Development of Chemically Induced Tumors: Role of Biological Response Modifiers (BRMS). *Immunobiol.* 167, 1984.
9. Shacks, S.J., Heiner, D.C., Bahna, S.L. and Horwitz, C.A.: Increased Serum IgG4 Levels in Acute Epstein-Barr Viral Mononucleosis. *Annals of Allergy*, Vol. 54, Number 4, 1985.
10. Shacks, S.J. and Johnson, C.S.: Serum Concentration of Total IgG and IgG4 in Sickle Cell Anemia. *American Society of Hematology Blood*, 66, Suppl. 1, 1986.
11. Shacks, S.J.: Reaching Hard-to-Reach Populations. *Proceedings of the 4th National Environmental Health Conference* (pages 265-69), U.S. Dept. of Health and Human Services, PHS, San Antonio, Texas June 20-23, 1989.
12. Taylor, S.C. and Shacks, S.J.: Lymphokine and NK Cell Activity in Sickle Cell Disease: Pediatric Asthma Allergy and Immunology. Vol. 3 #4, 1989.
13. Taylor, S.C., Shacks, S.J., Villicana, S.M., Olivares, J. and Dinkins, A.: Interferon Production In Sickle Cell Disease: Lymphokine Research, Vol. 9, No. 3: 415-423, July 1990.
14. Taylor, S.C., Shacks, S.J., Villicana, S.M., Olivares, J. and Dinkins, A.: Lymphocyte Blastogenic Responses in Sickle Cell Disease: Immunological Investigations, Vol. 20, Iss. 5: 645-655, 1991.
15. Taylor, S.C., Shacks, S.J., Mitchell, R.A.: Mononuclear Cell Profiles in Sickle Cell Disease: Regional Meetings-American Federation for Clinical Research, Carmel, CA, February 8-11, 1995.
16. Taylor, S.C., Shacks, S.J., Mitchell, R.A., and Banks, Aaron: Serum Interleukin-6 Levels in the Steady State of Sickle Cell Disease, *Journal of Interferon and Cytokine Research*, Vol. 15, Issue 12: 1061-1064, 1995.
17. Taylor, S.C., Shacks, S.J., Mitchell, R.A.: In Vitro Lymphocyte Blastogenic Responses and Cytokine Production in Sickle Cell Disease Patients with Acute Pneumonia, *Pediatric Infectious Disease Journal*, Vol. 15, Issue 4: 340-344, 1996.
18. Taylor, S.C., Shacks, S.J., Zengwei, Qu, and Wiley, Paul: Type 2 Cytosine Serum Levels in Healthy Sickle Cell Disease Patients, *Journal of the National Medical Association*, Vol. 89, No. 11, 1997

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel in the order listed on Form Page 2.
Photocopy this page or follow this format for each person.

NAME Beverly D. Taylor, MD		POSITION TITLE Associate Professor & Residency Director	
EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)			
INSTITUTION AND LOCATION	DEGREE (if applicable)	YEAR(s)	FIELD OF STUDY
Fisk University, Nashville, TN	B.A.	1972	Biology
Meharry Medical College, Nashville, TN	M.D.	1976	Medicine
Meharry Medical College, Nashville, TN	Post Grad. Training	1976-80	Family Med. & Preventive Med.

RESEARCH AND PROFESSIONAL EXPERIENCE: Concluding with present position, list, in chronological order, previous employment, experience, and honors. Include present membership on any Federal Government public advisory committee. List, in chronological order, the titles, all authors, and complete references to all publications during the past three years and to representative earlier publications pertinent to this application. If the list of publications in the last three years exceeds two pages, select the most pertinent publications. DO NOT EXCEED TWO PAGES.

PROFESSIONAL EXPERIENCE:

1986	Associate Professor, Clinical Community Health/Preventive Medicine, Department of Community Health/Preventive Medicine, Morehouse School of Medicine, Atlanta, GA.
1986	Director, Public Health/Preventive Medicine Residency Program, Department of CH/PM, Morehouse School of Medicine, Atlanta, GA
1985	Director Undergraduate Medical Education, Family Medicine Clerkship, Department of CH/FP, Morehouse School of Medicine, Atlanta, GA.
1984-85	Assistant Professor, Department of CH/FP, Morehouse School of Medicine, Atlanta, GA
1983-84	Part-time association with Med First Centers, Atlanta, GA
1983-84	Part-time association with Med First Centers, Atlanta, GA
1981-82	Private Practice, Birmingham, Alabama
1981	Assistant Professor - Department of Family Medicine and Community Medicine, Meharry Medical College, Nashville, TN
1980	Instructor - Joint appointments in Department of Family Medicine and Community Medicine, Meharry Medical College and Tennessee Department of Public Health, Mid-Cumberland Region.
1979-80	Chief Resident, Family Medicine Residency Program, Meharry Medical College
1976-80	Resident-Family Medicine & Preventive Medicine Residency Program, George Hubbard Hospital, Nashville, TN
1972-74	Counselor/Teacher - Biology - Upward Bound Program, Fisk University, Nashville, TN

SELECTED PUBLICATIONS:

1. Taylor, BD, Glazner, HK; Young, "Primary prevention of Hypertension: New Directions for the Nation". Presented at the American Occupational Health Conference, April 25-30, 1993.
2. Sung, JFC; Taylor B, et al. Maternal Marital Status and Racial Differences in Infant Mortality: A Georgia population based study (Abstract accepted for Prevention '92. Baltimore, MD Poster Presentation).
3. Fain M, Taylor BD, Johnson JC, Williams MP, Moss SE, Cultural and Linguistic Diversity in African American Alzheimer's Patients. Presented at American Speech-Language Hearing Association Annual Meeting, Marriott Marquis Hotel, Atlanta, GA, November 23 1991.

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BIOGRAPHICAL SKETCH

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University of Berkeley, Berkeley, CA	MPH	1992	Maternal and Child Health
Johns Hopkins University, Baltimore, MD	Ph.D.	1996	Reproductive Health

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EXPERIENCE

1995 Intern, Family Health International, Division of Contraceptive Use and Epidemiology.

1992-1995 Johns Hopkins University, Department of Population Dynamics. Baltimore, MD.

1992 Visiting Physician, Grady hospital, Department of Family Planning Clinic. Atlanta, GA.

1982-1991 Physician, Shanghai Public Health Center. Shanghai, China.

HONORS

Fellowship, Hewlett Foundation, 1992-1996

Scholarship, Starr Foundation, 1991-1992

Honored thesis, "Family Planning Programs and their Future at University of Berkeley", 1992

Outstanding Physician, Shanghai Public Health Center, 1986

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RESEARCH AND PROFESSIONAL EXPERIENCE: Concluding with present position, list, in chronological order, previous employment, experience, and honors. Include present membership on any Federal Government public advisory committee. List, in chronological order, the titles, all authors, and complete references to all publications during the past three years and to representative earlier publications pertinent to this application. If the list of publications in the last three years exceeds two pages, select the most pertinent publications. DO NOT EXCEED TWO PAGES.

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1992 - Present Research Assistant, Social Development Research Group, University of Washington, Seattle, WA
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 1989 - 1990 Research Assistant, Department of Epidemiology, University of Washington, Seattle, WA
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HONORS AND MEMBERSHIPS:

The third-class award for the studies on hypertension granted by Hubei province Government, PRC, 1988

Chinese Medical Association, PRC, 1986 - 88
 Hubei Epidemiologic Association, Hubei, PRC, 1986-1988
 Society for Epidemiologic Research, USA, 1993 - present

Outstanding Student, Tongji Medical University, PRC, 1981
 Outstanding Student, Tongji Medical University, PRC, 1980
 Outstanding Student, Tongji Medical University, PRC, 1979
 Outstanding Student, Tongji Medical University, PRC, 1978

SELECTED PUBLICATION:

1. Zhu K. A discussion of logical methods in research on causality between smoking and lung cancer. *Medicine and Philosophy* 1986;7:10-2.
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APPENDIX B

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BARRIERS TO SCREENING MAMMOGRAPHY UTILIZATION AMONG INNER CITY AFRICAN-AMERICAN WOMEN

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INTRODUCTION

Breast cancer is the most common cancer^{1,2} and the second leading cause of cancer mortality² among African-American women today. Studies have shown that African-American women have later stages of breast cancer at diagnosis as compared to White-American women.^{2,3} Since a late stage of disease is the major contributing factor to breast cancer survival,⁴ encouraging African-American women to receive early screening and treatment is imperative in reducing breast cancer mortality. Many health professional organizations recommend mammography screening once a year for women 50 and older and some recommend screening every 1 to 2 years for women 40 to 49 years old.⁵ Despite these recommendations, breast cancer screening rates still remain relatively low.^{6,7}

Many studies have been performed to determine the reasons that breast cancer screening rates are suboptimal. One major factor that limits screening mammography utilization is the lack of a recommendation to the patient by a health care provider.^{3,8,9,10,11,12,13,14} Other important factors that limit compliance with screening recommendations have included: lack of a regular physician,^{9,10,15,16} cost of the mammogram,^{9,17,18,19,20} low education levels,^{21,22,23} low income,^{21,22,23} time constraints in getting the mammogram,^{13,24} transportation problems,^{24,25} fear of finding cancer,^{12,19,26} embarrassment in getting the mammogram,^{9,24} lack of knowledge of screening recommendations by the women,^{9,11,24} believing that a screening mammogram is not necessary unless a woman has breast symptoms,^{11,16} and believing that mammography is not effective in detecting breast cancer.^{11,27} Of these studies reviewed, few focused on barriers to mammography utilization among African-American women and only one focused on low-income African-American women.

In order to obtain more information on factors that inhibit mammography use among African-American women, a case-control study was conducted focusing on African-American women with mammogram referrals at an inner-city, indigent care hospital in Atlanta, Georgia. At this hospital, an estimated 33% of the women who have scheduled screening mammogram appointments each year fail to keep their appointments. The purpose of this study was to specifically identify the psychological, socio-demographic factors, and medical care system factors that prevent these women from complying with their screening mammogram appointments.

RESEARCH FUNDING SUPPORT: The Cancer Prevention and Control Research Manpower Development Grant, No. DAMD 17-94-J-4437, and the Agency for Health Care Policy and Research, No. HS07400-05.

METHODS

Study Subjects

Black women 35 years of age and older who had a scheduled screening mammogram appointment at the inner-city hospital between January 3, 1996 and June 30, 1996 were selected to participate in this case-control study. Cases were defined as women who failed to keep their appointment and controls were defined as women who did keep their appointment. Women were excluded from the study if they did not have a telephone number or telephone contact, did not speak English, had a history of breast cancer, and were referred for mammography because of breast signs or symptoms.

To obtain and list the names and telephone numbers of women who qualified for the study, mammogram requisitions from the radiology department were reviewed each week of the study period and the names and telephone numbers of women who had mammogram appointments in the upcoming week were listed. Women were then divided into two groups - those who did not keep their appointments and those who did. After enumerating the individuals from both groups, a subset of individuals was selected into case and control groups. Using simple random sampling, an average of 12 cases and 12 controls were selected each week during the study period. Telephone interviews were performed by 4 trained interviewers. The interviewers were blinded to the case-control status of the study participants. The majority of the women (98.4%) were contacted within two months of the scheduled mammogram appointment while 1.6% were contacted between two and four months of the appointment. Women who were not reached by telephone after 6 attempts were excluded from the eligible subject pool.

Response Rate

A total of 1248 women who had screening mammogram appointments were called by telephone. Of these women, 27% were not able to be contacted due to disconnected phones, changed phone numbers, changed addresses, or no answers from the telephone calls (31% cases, 23% controls). Seven percent (7%) did not qualify for the study due to race, age, or history of breast cancer (8% cases, 6% controls). Only 13% refused to participate in the study (13% cases, 13% controls) and 3% were not able to participate due to medical illness or disability (4% cases, 2% controls). A total of 634 interviews were conducted.

From the 634 women interviewed, 22 were excluded due to having breast symptoms (breast mass, discharge, change in size or texture of the breast) and 10 were excluded due to incompleteness of key questionnaire items. In addition, women 35 to 39 years old were excluded from the analysis due to the small number of respondents in this age group (28 women). The final sample for analysis includes 574 women (239 cases and 335 controls).

Measurements

A 92-item pretested questionnaire was used to survey study participants. The outcome variable measured was the receipt of a screening mammogram by the patient. The predictor variables included: 1) socio-demographic information (age, marital status, income level, education level,

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employment status, number of children, age of children, method of transportation, and number of other individuals living in the household); 2) medical and family history; 3) screening mammography referral source; 4) knowledge of breast cancer risk factors and screening recommendations; 5) attitudes and beliefs surrounding breast cancer and screening recommendations; 6) prior breast cancer screening practices; and 7) reasons for not keeping the current mammogram appointment (for cases only).

To assess breast cancer screening knowledge, questions were asked pertaining to: 1) knowledge of 6 breast cancer risk factors (age, family history, early menarche, late menopause, first pregnancy after 30 years of age, and obesity) 2) knowledge of the three main screening tests for breast cancer [breast self-examination (BSE), clinical breast examination (CBE), and mammography] 3) knowledge of the age-specific screening recommendations for BSE, CBE, and mammography tests. These recommendations were based on guidelines by the American Cancer Society which recommends that all women perform BSE on a monthly basis and that women 40 and over receive a CBE every year.²⁸ For mammography, the ACS recommends screening every 1 to 2 years for women 40 to 49 years old and every year for women 50 and above.

To assess attitudes and beliefs surrounding breast cancer screening, study participants were asked questions pertaining to their perceived benefits of getting a mammogram, their feelings of susceptibility of getting breast cancer, and their emotional barriers to getting a mammogram (including fear, embarrassment, and feeling that the exam is painful).

To determine if the breast cancer screening practices of the women are associated with current mammography noncompliance, women were asked if they perform BSE, if they have ever received a CBE, and if they had received a mammogram prior to the one scheduled at the time of the study. In addition, they were asked the frequency of performing or receiving these screening tests.

Analysis

Bivariate analysis was initially performed to measure the associations between predictor variables and case-control status using Pearson's chi square test of statistical significance. Stepwise logistic regression was used to assess interactions between the variables and to adjust for potential confounders. The "best model" predicting mammography use was assessed using log-likelihood statistics. Adjusted odd's ratios and 95% confidence intervals were calculated to show the magnitude of the association between these variables and case-control status.

RESULTS

Socio-Demographics

There is no significant difference between cases and controls in terms of: marital status, education

level, income level, employment status, number of children, age of children, number of other individuals living in the household, and main method of transportation. In regard to age, cases were more likely to be younger than 60 years as compared to controls. One-fourth of the cases (25.9%) were 40 to 49 years old compared to only 16.1% of controls, and 30.5% of cases were 50-59 years old as compared to only 27.5% of controls (Table 1, Appendix).

Medical History, Family History, and Screening Mammography Referral Source

Cases were less likely to report having a history of a benign breast mass as compared to controls (9.6% vs. 18.9%, $p=0.002$, Table 1, Appendix). There was no difference in cases and controls in terms of a history of fibrocystic breast disease, a family history of breast cancer, and a family history of other types of cancer. Ninety-one percent (90.8%) of the cases reported being referred by a physician for the mammogram as compared to only 86.5% of the controls (Table 1, Appendix).

Knowledge, Attitudes, and Beliefs

Cases were more likely than controls to report that getting a mammogram is embarrassing (7.9% vs. 2.7%, $p=0.004$). In addition, 12.7% of the cases reported that there is no reason to get a mammogram if a woman is not sick as compared to only 5.7% of the controls ($p=0.004$). There was no difference in cases and controls in terms of knowledge of breast cancer risk factors, knowledge of the three types of screening tests for breast cancer, and knowledge of age-specific breast cancer screening recommendations. There was no differences between cases and controls in the belief that breast cancer can not be found at an early stage, finding and treating breast cancer early can save a woman's life, mammography is not effective in detecting breast cancer, mammography is not safe, there is no cure for detecting breast cancer, and getting a mammogram is painful. In addition, women in both the case and control groups were equally as likely to have the fear of finding breast cancer if they received the mammogram and that they are not susceptible to getting breast cancer.

Breast Cancer Screening Practices

Cases were slightly less likely than controls to receive mammograms according to American Cancer Society recommendations (64.0% vs. 72.8%, $p=0.07$). There was no difference in cases and controls in terms of performing BSE and receiving CBE according to ACS recommendations.

Multivariate Analysis -Factors Associated with Screening Mammography Noncompliance

Table 2 (Appendix) shows the results of stepwise logistic regression analysis. Factors significantly associated with missing the screening mammogram appointment include: 1) young age 2) not being married 3) history of having a benign breast mass 4) being referred for screening mammography by a physician as compared to a nurse practitioner or physician's assistant 5) believing that getting a mammogram is embarrassing and 6) believing that it is not

necessary for a woman to get a mammogram unless she is sick.

Relative to women 40 to 49 years old, the likelihood of missing a mammogram appointment decreases with increasing age. Women 60 to 69 years old were .49 less likely to miss their appointments as compared to women 40 to 49. In addition, women 70 years and older were .33 as likely to miss their appointments as compared to the younger women. There was no difference in mammography appointment compliance between women in the 40 to 49 year age group and those in the 50 to 59 year age group. In terms of marital status, women who were not married were 1.70 times likely to miss their mammogram appointments as compared to women who were married.

In terms of medical history, women who did not have a history of a benign breast lump were 2.38 times more likely to miss their appointments as compared to women who did have a history. Women who were referred by a nurse practitioner or physician's assistant were .25 times less likely to miss their mammogram appointments compared to women who were referred by a physician.

In terms of attitudes and beliefs about breast cancer prevention and control, women who believed that getting a mammogram is embarrassing were 2.67 times more likely to miss their appointments than women who did not have this belief. Furthermore, women who believed that getting a mammogram is not necessary unless one is sick were 2.19 times more likely to miss their mammogram appointments as compared to those who did not have this belief.

As a final question in the study, women were asked the reason for missing their screening mammogram appointments. Twenty percent (20%) said that they either forgot the appointment or got the appointment date/time confused. Other responses included being ill (13%), having a family member who was ill (2%), having a death in the family (4%), work conflicts (5%), bad weather (4%), transportation problems (3%), conflict with other medical appointments (3%), conflict with other nonspecific obligations (6%), money problems (2%), and being out of town (3%).

DISCUSSION

In this study, age is inversely related to compliance with screening mammogram appointments among African-American women. Women younger than 60 years old are more likely to miss their appointments than older women. Although some studies reveal that older women are the ones who are less likely to adhere to screening mammogram recommendations,^{9,27,29} the results of our study are consistent with other studies that have shown that younger women are less likely to adhere to screening recommendations.^{13,22,30,31} The results of our study imply that barriers to mammography utilization among younger African-American women need to be addressed. Although many studies have shown the association of age with mammography utilization, few have specifically addressed the barriers to utilization in different age groups.

Outside of age, the only other demographic factor that is significantly associated with missing the mammogram appointment is not being married. At least one other study supports this finding in that, among African-American women 40 to 49 years old, those who were married were more likely have received a recent mammogram as compared to those who were not married.³⁰ Perhaps women who are married have the extra support and encouragement from their spouses to get a mammogram.

Another significant finding in our study is that women who do not have a history of a benign breast lump are more likely to miss their appointments as compared to women who kept their appointments. Perhaps women who have had a benign breast lump in the past consider themselves to be more at risk for developing a breast lump a second time, or even developing cancer. It is also possible that these women received more education from their providers on the importance of mammography, thus prompting them to comply with future mammogram appointments.

Of interest, there was no difference in our study between women who missed their appointments and those who did not in terms of knowledge of breast cancer risk factors and screening. In terms of attitudes and beliefs, women who missed their appointments are more likely to believe that getting a mammogram is embarrassing and that a mammogram is not necessary unless one is sick. The literature reveals that women who have these two particular negative attitudes (among others) are less likely to adhere to screening mammography recommendations.^{9,11,16,24} The findings in our study implies that knowledge alone may not be sufficient to motivate women to get mammograms. Women may still harbor negative attitudes about this process which may hinder them from complying with the recommendations.

A fourth finding in our study is that women who were referred for mammography by a physician were less likely to keep their mammogram appointments as compared to women who were referred by a nurse practitioner or a physician's assistant. The literature shows that one of the major predictors of mammography utilization is getting a recommendation from a physician.^{8,9,11,12,13,14} None of the studies reviewed actually accessed the association between mammography compliance and being referred by a physician as compared to being referred by another health care provider. The fact that women in our study were more likely to keep their mammogram appointments if they were referred by a nurse practitioner or physician's assistant makes one consider that there may be communication styles that differ between the various types of health care providers. Perhaps nurse practitioners or physician's assistants have more effective communication styles that prompt women to comply with screening mammogram recommendations. Another factor to consider is the time limitations faced by many physicians when seeing a patient. There may be not be ample time to educate the patient on screening mammography in the limited time allotted per each patient visit. Despite these potential physician-specific barriers to recommending screening mammograms to patients, our study does reveal that the vast majority of cases and controls were referred for screening mammography by a physician.

A final significant finding of this study is that 20% of the women who missed their appointments reported that they either forgot or got the appointment date or time confused. This result indicates that interventions should be developed to prompt African-American women to remember their mammogram appointments. Many studies have been performed to evaluate interventions aimed at increasing women's compliance rates with annual or biannual screening mammogram recommendations. Most of these studies reveal that breast cancer interventions which incorporate some type of reminder system are effective in increasing mammography compliance.^{32,33,34,35,36,37,38} The reminder systems in these studies have included telephone reminders, reminder postcards, physician letters, and tailored letters to address women's specific perceptions about breast cancer screening.

Study Limitations

The results of this study are only generalizable to urban African-American women who already have mammogram appointments. Although this can be considered a weakness, it can also be a strength. The results provide valuable information to the gap of knowledge in the literature since few studies have been performed to specifically assess the barriers to compliance with screening mammogram appointments among African-American women. This study may have been limited by selection bias due to the higher than expected number of eligible study subjects who could not be reached by telephone (27%) and the slight differential in this regard (31% cases, 23% controls). If the women without telephone contacts are the ones who also have significant barriers to mammography utilization, the prevalence of barriers among cases in our study would be underestimated.

With all of the current available information on breast cancer screening, study participants may have been aware of and reported "acceptable answers" to the knowledge, attitude, beliefs, and behavior questions. These types of responses could have led to an underestimation of the difference in barriers to mammography utilization between cases and controls. The fact that few of these factors differed significantly between cases and controls makes such an underestimation unlikely. Despite these potential limitations in this study, only 13% of the eligible subjects refused to participate and the rate of nonparticipation was the same between cases and controls.

CONCLUSIONS

In conclusion, our study suggests that more studies need to be performed to determine the barriers to mammography use among younger African-American women, especially those in the 40 to 49 year old age group. Interventions can then be developed that will address and remove significant barriers among these women. Health education strategies need to go above and beyond the knowledge of screening recommendations and address the attitudes that prevent African-American women from getting mammograms. Women need to especially be taught that breast symptoms or a history of breast disease is not necessary in order to receive a screening mammogram. Health education strategies also need to focus on providers to educate them on the effective communication styles that will prompt women to get mammograms. The education

messages utilized by providers should not only enhance women's knowledge of screening mammography recommendations, but should address common negative attitudes and beliefs that women have about mammograms. Finally, it is important for health care organizations to incorporate reminder systems into their services which will prompt women to receive screening mammograms on a timely and regular basis.

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APPENDIX

Table 1. Socio-Demographic Characteristics of Study Participants, by Case-Control Status

Variable	Cases (239) %	Controls (335) %	P-value
<u>Age (yrs)</u>			
40 - 49	25.9	16.1	0.005
50 - 59	30.5	27.5	
60 - 69	26.8	30.7	
70 - 89	16.7	25.7	
<u>Marital Status</u>			
Not Married	86.6	81.5	0.21
Married	13.4	18.2	
Don't Know/Refused Response	0.3	
<u>Education</u>			
Less than H.S.	58.2	61.2	0.45
H.S.	25.9	26.6	
More than H.S.	15.9	12.2	
<u>Income (\$)</u>			
< 400/mo.	18.8	13.7	0.43
400 - 800/mo.	51.5	57.0	
> 800/mo.	23.0	22.7	
Don't Know/Refused	6.7	6.6	
<u>Employment Status</u>			
Unemployed	76.2	74.0	0.81
Employed	23.4	25.7	
Don't Know/Refused Response	0.3	
<u>Number of Children</u>			
0	14.6	15.5	0.67
1	13.8	16.1	
2 - 3	33.1	28.7	
≥ 4	38.5	39.7	
<u>Age of Children¹</u>			
≤ 17 years old	13.3	9.3	0.17
> 17 years old	86.7	90.7	

¹N=203 for cases and 279 for controls

Table 1. Socio-Demographic Characteristics of Study Participants, by Case-Control Status (cont.)

Variable	Cases (N) %	Controls (N) %	P-value
<u>Number of Other People in Household</u>			
0	29.3	33.4	0.57
1	25.5	22.4	
2	18.4	17.9	
3 or more	25.5	23.6	
Don't Know/Refused Response	1.3	2.7	
<u>Method of Transportation</u>			
Own Car	22.2	24.8	0.88
Other Person's Car	19.7	19.1	
Public Transportation	51.0	50.4	
Other	7.1	5.7	
<u>Medical and Family History</u>			
History of Benign Breast Mass (yes)	9.6	18.9	0.002
History of Fibrocystic Breast Disease (yes)	3.8	4.8	0.55
Family History of Breast Cancer (yes)	15.7	16.1	0.89
Family History of Other Cancer (yes)	48.1	45.4	0.52
<u>Screening Mammography Referral Source</u>			
Physician	90.8	86.5	0.05
Nurse Practitioner or Physician's Assistant	1.7	6.3	
Self/Other	7.1	6.3	
Don't Know/Response	.4	.9	

Table 2. Multivariate Analysis of Factors Associated with Screening Mammography Noncompliance

Variable	Adjusted Odds Ratio	95% CI	P-value
Age (years)			
40 - 49	1.00	Referent	
50 - 59	.74	Pending	0.25
60 - 69	.49	Pending	0.006
70 +	.33	Pending	0.0001
History of benign breast mass			
Yes	1.00	Referent	
No	2.38	Pending	0.0016
Marital Status			
Married	1.00	Referent	
Not Married	1.70	Pending	0.04
Mammography Referral Source			
Physician	1.00	Referent	
Nurse Practitioner or Physician's Assistant	.24	Pending	0.01
Self/Other	1.13	Pending	0.74
Belief that getting a mammogram is embarrassing			
No	1.00	Referent	
Yes	2.67	Pending	0.02
Belief that there is no reason for a woman to get a mammogram if she is not sick			
No	1.00	Referent	
Yes	2.19	Pending	0.02

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APPENDIX C

ELECTROMAGNETIC FIELD EXPOSURE AND THE OCCURRENCE OF BREAST CANCER IN WOMEN.

INTRODUCTION

Over the past decades there has been numerous reports of modest to acute associated risk for the occurrence of different kinds of cancer due to exposure to EMF (Anthony and Thomas, 1970; Menck and Henderson, 1976; Tola, 1980; Savitz et. al., 1987) and more recently these reports include cancer of the mammary tissues (Kusano et. al., 1994; Azadniv et. al., 1995). Research leading to these recent report is still in the elementary stage and is therefore inconclusive. However, there are strong indications that with well planned and well executed research procedures, more definitive results may be forthcoming that will conclusively indicate that exposure to EMF play a role in the occurrence of breast cancer.

This research investigates this possibility since there is a surge in the number of women employed in occupations that expose them to EMF. With the advancement of technology as well as the increase in the development of new and more sophisticated household electrical appliances, many women are also at risk of exposure to EMF at home.

Cell-cell interaction play an important role in maintaining normal growth of normal cells. Cells make contact and communicate with each other via permanent structures such as gap junctions, lamellapodia, filopodia, and microvilli. However, immediately following cell divisions, daughter cells communicate with each other via cell surface receptors. The existence of these surface receptors has been shown to be responsible for the initial contact that occurs when fertilization is effected (Lopez et. al., 1985; Lopez and Shur, 1987; Cardullo and Wolf, 1995). GTase is a protein that acts as a receptor when located to the plasma membrane of cells. It has the affinity to bind the galactose on terminally galactosylated glycoproteins located on the plasma membrane of other cells. The lock and key theory (Roseman, 1970) locates GTase on the key and terminally galactosylated glycoprotein in the lock. When the key fits into the lock by the binding of GTase to galactose, a temporary means of communication between daughter cells is

established pending the formation of the structures that act as permanent means of communication.

However, these normal processes may be hindered when cells are exposed to cancer causing and/or cancer growth promoting agents. One hypothesis is that exposure to EMF promotes cancer formation or cancer growth rather than initiate it. Moreover, it has been established that EMF increases the rate of production of normal proteins as well as causes the syntheses of new proteins (Azadniv et. al.; 1994). This increase in syntheses especially at sites where the key and lock are located may prevent the key fitting perfectly into the lock. This type of increase has also been associated with increase in the incidences of plasma membrane projections in transformed cells (Brown and Browne, 1988) thus preventing the execution of the lock and key mechanism. Absence of fit will prevent the establishment of the temporary means of communication between daughter cells. The cells may then continue to divide nonstop causing tumors (Roseman, 1970; Pat and Grimes, 1974) which may become malignant. The cells may then proliferate thus spreading the cancer.

It has also been proposed that EMF can effect cytotoxicity by inhibiting the ability of T-lymphocytes to attack cancer cells (Severson et. al., 1988; Milham, 1988). EMF exposed cancer cells may also become more aggressive and demonstrate increased capacity to proliferate when compared to unexposed cancer cells.

If as previously suggested, that an increase in the syntheses of normal proteins may be cancer-causing, then an increase in the levels of ornithine decarboxylase activity may indicate malignancy. ODC plays a key role in the biosynthesis of polyamides, which are necessary for protein and DNA syntheses and hence necessary for cell growth and differentiation. Its expression is very tightly controlled in all normal cells; however, regulation of its expression is altered in many tumor cells resulting in much higher levels of ODC in tumors. This increase in basal levels has been shown to play a causal role in the development of tumors by driving the

continued proliferation and selective clonal expansion of initiated cells in epithelial tissues. Over-expression of ODC has also been shown to enhance tumor development in initiated keratinocyte cell lines (Murakami et. al, 1994; Clifford et. al., 1995; Megosh et. al., 1995). It may then be implied that agents such as EMF that may promote cell growth will increase ODC activity. An increase in the levels of ODC activity in cells exposed to EMF may then be used as an indicator of malignancy (Kusano et. al. 1994; Azadniv et. al., 1995; Kubota et. al., 1995).

This study is undertaken to show the effect that EMF exposure may have on the structural features of V12 cell line as well as any changes in ODC activity levels. The effect of EMF exposure on fibrocystic disease cells is also being studied in MCF-10 cell line.

The outcome of the study will determine the possibility of the development of invaluable tests, that may be used to screen women exposed to abnormal levels of EMF for the onset of breast cancer. This outcome may also be used to determine if the tumors in women suffering from fibrocystic disease, and exposed to abnormal levels of EMF have become cancerous.

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MATERIALS AND METHODS

Cells: Human female normal mammary (V12), fibrocystic disease mammary (MCF-10), and (BJ 559) transformed human mammary cell lines were kindly provided by Dr. Josiah Ochieng of Meharry medical College. The cells were cultured in DMEM containing epidermal growth factor, insuline, and cholera toxin (GIBCO Life Technology Laboratories, P.O. Box 68, Grand Islands, NY 14072-0068), at 37°C under an atomosphere of 5% CO₂ in air.

The cell stocks were routinely subcultured by trypsinization with 0.25% trypsin: 1mN EDTA. The cells were seeded into 75 cm² plastic tissue culture flask (Corning 25110-75) for routine maintenance. After each subculturing, the cells were frozen in liquid nitorgen in a medium containing DMSO. The cells from each cell line was photographed and the negatives were developed at the Electron Microscopy Research Laboratory at Clark Atlanta University.

Chemicals: L-ornithine, benzethonium hydroxide, TPA, dithiothreitol, and pyridoxal-5-phosphate will be purchased from Sigma Chemical Co. (P.O. Box 14508, St. Louis, MO 63112).

L-[1-¹⁴C] ornithine (50-60 mCi/mmol) will be obtained from New England Nuclear Research Products (Barley Mill Plaza, P-24, Wilmington, DE 19898).

Electromagnetic Field: A high power microwave oven will be used to generate different levels of EMF (20, 40, 60, and 80 Hz) that the cells will be exposed to. However, the cells will be maintained at 37°C even during exposure to EMF.

Controls: The V12, MCF-10, and BJ 599 cells will be exposed to TPA (0.1µg/mL) for periods similar to EMF expousure times as positive control treatments to confirm that treatment-related increases in ODC activity are detectable.

Electron Microscopy: Photographs will be taken and electron microscopic studies will be carried out on each cell line prior to and after exposure to EMF to determine if any structural changes have occurred using previously established methods (Browne et. al., 1997).

Cell Extracts: Cell extracts will be prepared by removing growth medium from each culture dish at the end of EMF exposure and TPA treatment. The cell monolayers will be washed 3X with cold PBS. Cells will be removed and collected in 15mL centrifuge tubes (Corning 25311-15) and centrifuged for 5 min. at 2000 rpm. After decanting the PBS buffer, Tris-buffer (10mM Tris-HCl containing 1.72mM dithiothreitol pH 7.2) will be added to the cell pellet in cryogenic vials and kept in liquid nitrogen until assayed for ODC activity.

Assay for ODC Activity: ODC activity will be determined using L-[1-¹⁴C] ornithine as a substrate as previously described (Azadniv et. al., 1995).

Assay for Protein: The Lowry method will be used for protein determination (Lowry et. al., 1951).

Data Analysis: The ANOVA method will be used for data analysis, comparing ODC activity levels of EMF exposed cells to that of TPA treated control cells.

RESULTS

The culturing of V12 and BJ 599 cell lines was accomplished without any incidence. However, some difficulties were experienced with MCF-10 cell line. On two occasions, the culturing of this cell line was restarted because the cells died out. Figures 1,2, and 3 show the V12, BJ 599, and MCF-10 cell lines five days after sub-culturing was started. The cell lines were stored, frozen in liquid nitrogen in a medium containing DMSO.

DISCUSSIONS

Figures 1, 2, and 3 show the cell lines five days into sub-culturing. In figure 1, the cell were attached but growth has not reached complete confluency. In figure 2, the cell growth had reached confluency, but growth did not stop as indicated by the clumps of cells. This behavior is typical of transformed cells, growth never stops even when confluency is attained. Figure 3 shows the slow growth of the MCF-10 cell lines. On two occasions, growth did not proceed and the cells just died out. This is not unusual as per my discussions with Dr. Ochieng of Meharry Medical College, who indicated that he had similar experience with the MCF-10 cell line.

CONCLUSIONS

No conclusions are available at this time.

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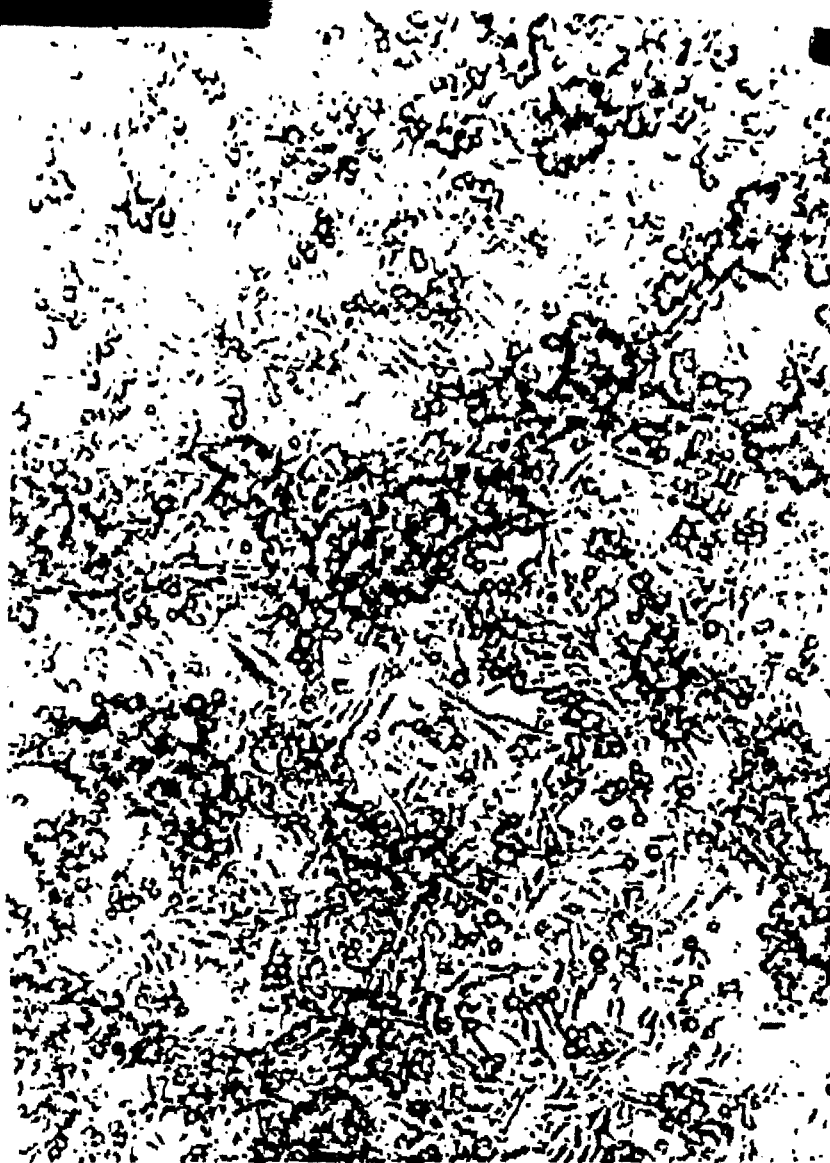
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10x x 2.5 x 5.5

Figure 3:
Human Female Fibrocystic Disease
Mammary MCF- 10 Cell line
Five days after subculturing started.



10x x 2.5 x 5.5

Figure 2:
Human Female Transformed Mammary
B J 599 Cell line five days after
Subculturing started.



10x x 2.5 x 5.5

Figure 1:
Human Female Normal Mammary
V 12 Cell line five days after
Subculturing started.

APPENDIX D1

**CORRELATES OF BREAST CANCER SCREENING AMONG AFRICAN
AMERICAN FEMALE RESIDENTS OF AN URBAN PUBLIC HOUSING
COMMUNITY: A PILOT STUDY**

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Nationwide, breast cancer has been ranked first among the five most common cancer sites for African American women, and it is the leading cause of cancer death for African American women who are between the ages of 35-54 years. Across all ages, African American women have a lower incidence rate of breast cancer than white women, suffer lower 5-year relative survival rates, and are more likely than their white counterparts to die of breast cancer. The disparity in survival rates has been attributed to late-stage diagnosis of cancer, poverty, and limited access to quality care. Routine breast cancer screening, such as breast self-examination (BSE), clinical breast examination (CBE) and mammography, can diagnose cancers at an earlier stage, and early diagnosis increases the likelihood of surviving breast cancer. Nevertheless, underutilization of breast cancer screening continues to be a challenge among many poor and African American women. This pilot study was conducted to examine correlates of breast cancer screening among African American female residents of an urban public housing community.

Residents of an urban public housing community collaborated with Drew University Cancer Consortium and other community-based organizations to implement breast health awareness education intervention program within the housing community. Between January 1997 and February 1997, 199 African American female residents, who were at least 21 years of age, were distributed breast health information packets and recruited to attend one of two, 3-hour, Saturday, breakfast breast health awareness workshops, convened on the grounds of the housing development. During the workshops, the women were provided with facts and figures about breast cancer and a review of breast cancer screening techniques by an African American female physician, testimonies from African American breast cancer survivors regarding screening, treatment, and recovery issues, and hands-on practice with performing BSE.

Keywords: Public Housing, African American, Breast Cancer, Screening, Health Provider Communication

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A 58-item pre-intervention survey was administered to the women to collect data about their knowledge, attitudes, beliefs, and behaviors regarding breast cancer and breast cancer screening.

A total of 72 women attended the two workshops, representing 36% of the 199 recruited. The mean age of the participants was 44 years ($sd=14.44$), with an age range of 21 to 83 years. Fifty-two percent of the women were single. The women had a mean of 2.9 children ($sd=2.21$). Completion of at least the 12th grade was reported by 34% of the sample. Work outside of the home was reported by 37% of the women, with 40% reporting an annual income of less than \$5,000. Nineteen percent of the sample did not have medical insurance. The women reported a mode of once-weekly church attendance, with Baptist (49%) and Methodist (35%) faiths being the first and second most frequently reported religious practices. The data revealed that the women possessed a high level of awareness about breast self-examination and mammography, with 92% and 90% reporting familiarity with these screening methods, respectively. Ever performing BSE was reported by 64% of the women; however, only 18% of the sample reported performing monthly BSE. Fifty-three percent of the sample reported at least one mammogram, with a mean of 1.33 mammograms ($sd=2.3$) reported for the period of 1986 to 1996. There was a significant positive correlation between women ever having a mammogram and their health practitioners suggesting a mammogram ($r=.70$, $p<.05$). On the other hand, while 83% of the sample reported having a breast exam performed by a health practitioner (CBE), only 68% indicated having ever heard of a CBE. Having a first degree relative who was either diagnosed with or died from breast cancer was not significantly correlated with perceived importance of breast cancer screening, with having a mammogram, or with a health practitioner suggesting BSE, CBE, or a mammogram. Five true/false items assessed knowledge and myths about breast cancer. While 79% of the sample indicated that whites are more likely than African Americans to get cancer, 85% of the women did not know that African American women have a lower incidence of breast cancer relative to their white counterparts. Fifty percent of the sample incorrectly indicated that black women are less likely than white women to die from breast cancer, 26% reported the belief that women can get cancer by allowing their breasts to be squeezed, and 60% indicated that surgery exposes cancer to the air, causing the cancer to spread. None of these items were significantly correlated with having a mammogram.

Communication with a health practitioner about breast cancer screening was the most significant correlate for having a mammogram among African American female residents of an urban public housing community. It is critical that health care providers of low-income African American women become full, active partners in developing breast cancer education and information resources and diffusion strategies. Physician-patient dialogue must be structured to communicate the importance of early detection and treatment of breast cancer to a population of women disproportionately affected by this disease.

APPENDIX D2

THE SEXUAL SIDE EFFECTS OF BREAST CANCER TREATMENTS AMONG AFRICAN AMERICAN WOMEN

AIMS

The purpose of the proposed study is to examine the perceived changes in sexual functioning among African American women following treatment for breast cancer. The specific aims of this proposal are to:

1. Assess perceived changes in sexual functioning, at pre and post treatment, among women receiving surgery, chemotherapy, radiotherapy, or combinations thereof, for the treatment of breast cancer;
2. Compare perceived changes in sexual functioning, at pre and post treatment, across treatment modalities;
3. Compare perceived changes in sexual functioning at pre and post treatment, between women who had breast-sparing treatment and women who had a mastectomy;
4. Compare perceived changes in sexual functioning, at pre and post treatment, between mastectomy patients who have received reconstructive surgery and mastectomy patients who have not received reconstructive surgery.

SIGNIFICANCE

Breast cancer is a major health problem in the United States.¹ It is the most commonly diagnosed cancer in women in the United States.² A woman in the United States has a 1 in 8 lifetime risk of developing breast cancer and a 1 in 28 lifetime risk of dying from breast cancer.³ Each year in California, breast cancer accounts for nearly one in every three new invasive cancers diagnosed among women and one in every six cancer-related deaths. Current data indicates that one in eight California women can be expected to develop invasive breast cancer during her lifetime.⁴ In Los Angeles County, between 1972 and 1987, breast cancer incidence accounted for 28% of the cancer incidence and 20% of the cancer mortality for females of all ages and races.⁵

Nationwide, breast cancer is the leading cause of cancer death for African American women between the ages of 35-54 years.³ Across all ages, African American women have a lower incidence rate of breast cancer than white women (101.0 versus 113.1 per 100,000, respectively); nevertheless, African American women are more likely to die of breast cancer (31.2 per 100,000) than their white counterparts (26.0 per 100,000). In addition, among women younger than 45 years of age, African American women are more likely than white women to develop breast cancer.⁶ In comparison to white women, breast cancer in African American women may be diagnosed at later stages, may be more likely to be estrogen-receptor negative, and may be more aggressive and difficult to treat.^{3,7,8}

All current treatments for breast cancer result in serious sexual impairments.⁹ Nevertheless, treatment-induced sexual side effects is a subject of rare discussion or investigation within in the medical and scientific communities.¹⁰ The psychological and psychosexual well-being of women with breast cancer is an important concern that is often been overlooked in the rehabilitation of women with this disease.¹ For example, a recent (1/97) telephone poll of eight Los Angeles-based breast cancer education/treatment centers, found that only one agency had information for dissemination to breast cancer patients on the sexual side effects of treatment; the others indicated they refer patients for counseling if it seems necessary. To date, no studies have been published investigating the sexual side effects of breast cancer treatment modalities among African American women. The data available on treatment-induced sexual side effects have been collected from primarily white cohorts.¹¹ Given the paucity of data available on the quality of survivorship among African American women diagnosed with breast cancer, especially regarding the sexual side effects of treatment, it is critical to address this issue which assuredly impacts the quality of life for this subpopulation of cancer survivors.

BACKGROUND

The female breast has historically been glamorized, idealized, and sensationalized. In a society where a woman's breasts are valued as symbols of sexuality and nurturance, the possibility of mastectomy or any

physical change of the breast is perceived as an assault on the women's self-image and self-esteem.^{12,13} A diagnosis of breast cancer typically creates a condition of emotional vulnerability, where women with breast cancer are often more afraid of losing their husbands or lovers, or, if single, of not being able to attract new partners, than they are about the possibility of facing a cruel and untimely death.¹⁴ The psychosexual morbidity of breast cancer is an outgrowth of a woman's stage of life, stage of disease, the type(s) of treatment she must undergo, her psychologic makeup, and her repertoire of coping strategies.¹² Studies have found that the sexual dysfunction following breast cancer treatment is affected by stage of disease, level of physical discomfort, toxicity of treatments, change in body image change, drug use, and marital relationship.^{9,15,16}

For many individuals, sexual well-being is a critical component of feeling alive and connected with another human being.¹² A review of the handful of studies that have investigated sexuality among healthy African American women reveals that, in general, African American women view sexuality as natural and positive they are less accepting than their white counterparts of masturbation, oral sex, and homosexuality as forms of sexual expression,¹⁷ sexual satisfaction is as important to women as it is to their sex partners,¹⁸ and dissatisfaction with body image and weight does not exert an overwhelming negative influence on their sexual activity.¹⁹

Current treatments for breast cancer include mastectomy (radical or modified radical), lumpectomy along with radiation and axillary node resection, adjuvant radiotherapy or chemotherapy, radiotherapy, chemotherapy, and endocrine treatments.³ Fatigue, nausea, vomiting, hair loss, hot flashes, and weight gain are the common, non-sexual side effects experienced by women undergoing the cytotoxic treatment regimens.^{9,10} However, all current treatments for breast cancer can have serious sexual side effects, including decreased libido, negative body image, decreased self-esteem, decreased self-confidence, decreased or absent orgasmic function, and decreased or absent vaginal muscle tone and lubrication.^{12,13,20} None of these treatment-induced sexual side effects have been examined for their impact on the quality of life African American breast cancer survivors.

Women diagnosed with early breast cancer have the opportunity to receive breast-conserving surgical treatment, which reduces the physical and psychological morbidity associated with breast removal.²¹ Clinical trials have demonstrated that breast-conserving surgery followed by radiotherapy is as effective as modified radical mastectomy in treating women with localized breast cancer.²² In the majority of patients so treated, the breast is usually minimally changed from its previous state of appearance, touch, and tactile sensation.²³ A mastectomy has not been found to impact the female sexual response cycle,²⁰ but many patients and their partners do experience some sexual difficulties because of the adverse emotional consequences. Because some women fear their partners being appalled by the sight of their breastless bodies and/or scars/burns, they develop a pattern of sexual avoidance and decrease in kissing activity, because they anticipate rejection.²⁰ Studies have shown that women with mastectomies felt more much more negative about their nude appearance, much more self-conscious in groups of women, less sexually desirable, more dissatisfied with their body images, experience less enjoyment in their sexual relationships, as compared to women with lumpectomies.^{1,24,25}

Trend analyses indicate a significant increase in the use of breast-conserving surgery,²⁶ even if there is a slight statistical increase in the risk of recurrence.⁹ Study findings remain inconclusive about racial differences in the use of breast-conserving surgery. While some studies have found no demographic differences in the use of this treatment modality,²⁷ others have found that African American women are less likely than white women to undergo breast-conserving surgery,^{21,28} while others report that African American women are more likely to have breast-conserving surgery.²⁹

Breast reconstruction surgery is available to an increasing number of mastectomy patients. Over 40,000 postmastectomy breast reconstructions are performed annually.³⁰ Avoiding the delay between breast amputation and repair facilitates a return to former activities, and has been found to significantly reduce hostility, anxiety, and depression.³¹ In addition, reconstructed women may be less negative about their bodies, less anxious sexually, and more open to responding to sexual stimuli, than their mastectomy

counterparts.³² While there is no published data on the distribution of reconstruction surgery across ethnicities, available data does indicate that African American women have not embraced cosmetic and reconstructive surgery with the same enthusiasm as their white counterparts, because of fear of hypertrophic scars.³³ Other studies have found that African American are less likely to be referred for postmastectomy rehabilitation.³⁴

Chemotherapy can be much more destructive to a woman's sexuality than surgery. The side effects of commonly used adjuvant chemotherapeutic agents and regimens often include fatigue, lethargy, depression, nausea, vomiting, hair loss, susceptibility to infection, weight gain, and many others. A woman who is fatigued, has lost her hair, and has become overweight does not feel sexually desirable, especially when this happens a few weeks after she has lost her breast(s).⁹ The chemotherapeutic agents used to treat breast cancer destroy ovarian functioning which produces premature menopause, and can potentially impair all three phases of the female sexual response cycle—desire, excitement, and orgasm. Specifically, chemotherapy interferes with the secretion of estrogen and testosterone, resulting in estrogen and testosterone deficiencies. These deficiencies subsequently impair the physiology of the excitement phase of the female sexual response cycle,^{35,36} and a global loss of sexual desire and diminished sexual pleasure and fantasy,⁹ respectively. An examination of over 36,905 cases of breast cancer diagnosed between 1978-1992 showed that African American women are more likely than whites to be treated nonsurgically or have no cancer-directed therapy, after controlling for age, stage, and histology.³⁷

Body image is a mental picture of the physical self and includes attitudes and perceptions regarding one's physical appearance, state of health, skills, and sexuality.^{1,9,16} An understanding of body image as a component of self-concept, provides a framework for studying the responses of women to treatment for breast cancer, as these responses reflect the importance of the female breast as a symbol of womanliness, sexual attractiveness, and nurturance.²⁰ It is imperative for any woman to understand the degree to which she considers her breasts as essential to her self-esteem, sense of worth, and overall sexual gratification. Studies investigating factors influencing options in breast cancer treatment have found that breasts are an important source for women to be able feminine in a physical sense, see themselves as being attractive, being able to feel sexually desirable.²³ For example, preservation of sexual attractiveness and function may be a causative factor in women choosing breast-sparing procedures.¹²

While not all women experience sexual dysfunction after treatment for breast cancer, pre-operative interviewing, patient education on treatment-induced sexual side effects, and post-treatment follow-up regarding sexual responses should be the minimum level of attention given by health care providers to breast cancer patients about the psychosexual side effects of their treatment.

The major outcome variable for this study is perceived changes in sexual functioning. Surgery, radiotherapy, chemotherapy, and pre-morbid sexual functioning are the **independent variables**. Body image, pre-treatment counseling/education by health care provider, and breast reconstruction are the proposed **mediating variables**. This study will examine treatment-induced sexual side effects across stage of disease and treatment modalities. This study will also examine the mediating effects of body image, the psychological meaning of breasts for women, breast reconstruction, and level of pre-treatment preparation by health care providers, on the relationship between breast cancer treatments and sexual side effects.

HYPOTHESES

The specific hypotheses that will be tested with the study data include:

1. Women who undergo breast-sparing surgery will report less negative changes in sexual functioning than women who have a mastectomy;
2. Women who receive adjuvant radiotherapy will report less negative changes in sexual functioning than women who receive adjuvant chemotherapy;
3. Women who receive breast reconstruction will report less negative changes in sexual functioning than women who do not receive breast reconstruction;
4. Women who report receiving pre-treatment counseling by their health care provider will report less negative changes in sexual functioning than women who did not receive pre-treatment counseling;

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Study Design

A cross-sectional descriptive study design using focus groups and self-administered mail-in surveys will investigate the perceived sexual side effects of breast cancer treatment. The proposed study will be completed in 12 months, with an anticipated start date of 06/15/97 and the completion date of 07/15/98.

Study Population

Inclusion criteria. Women who are African American, between 35-70 years of age, diagnosed with stage I, II, or III breast cancer, report sexual activity for six months prior to cancer diagnosis (i.e., at least one episode per month), no less than three months and no greater than two years post surgery (mastectomy or lumpectomy), radiotherapy and/or chemotherapy, free of any other chronic disease that may affect body image (e.g., rheumatoid arthritis, multiple sclerosis, severe cardiac disease), and free of recurrences, are eligible for participation in the study.

Methodology

Subject recruitment. Concurrent implementation of two recruitment strategies will occur to recruit participants from breast cancer treatment centers and support groups serving a predominantly African American population of women, within Los Angeles County. Women will be recruited from the "Reach to Recovery" and "Look Good...Feel Good" programs of the Central and South Central Los Angeles units of ACS, the Women of Essence Breast Cancer Support Group, Los Angeles County-King-Drew Medical Breast Treatment Center, and Los Angeles County-King-Drew Medical Center Cancer Support Group (See Appendix B for Letters of Support). Participation in the study will be voluntary.

One recruitment strategy involves the conduct of outreach to African American women at venues of natural gathering. Study personnel will attend support group meetings, club meetings, and health fairs to provide an overview of the study, and distribute information flyers containing the contact number of the project office. Women interested in study participation will be asked to complete and submit a short biographical data sheet with their name, address, phone number, age, date of birth, date of last treatment, date of diagnosis, frequency of sexual activity before diagnosis, treatment modality, number of recurrences, and presence or other chronic illnesses. Upon reviewing the data sheets, study personnel will contact eligible women by telephone to enroll them in the study.

The second recruitment strategy involves working collaboratively with breast cancer treatment centers. Study personnel will meet, separately, with the patient liaisons at the breast treatment centers to compile a roster of potential participants. Accompanied by a letter of support from each treatment center, letters inviting participation in the study - describing the nature, scope, and future implications of the study, the level of time commitment required, the incentives for participation, and the procedures for registering for study participation - will be mailed to each patient on the roster. All potential participants will then be contacted by telephone to explain the study, complete the biographical data sheet, and enrolled into the study. A maximum of four attempts will be made to contact the women by telephone. Once enrolled, the women will be mailed a study packet as described below. The most current available CSP data will be used to examine the representativeness of the volunteer study sample for African American women with breast cancer.

Sample Size. A preliminary assessment of membership and patient rosters has identified approximately 150 eligible African American women available for recruitment into the study. Based upon the investigator's history working with this population, it is estimated that approximately 60% ($n=90$) of eligible women will volunteer to participate in the study. Power analysis indicated that, for a one-tailed test at a $p=0.05$ level of significance, a sample size of 88 is adequate to detect a minimum correlation of 0.30.³⁸ Thus, a sample size of 90 will provide adequate power.

Data collection. A combination of data collection strategies will be used to assist in measuring the perceived level of change in sexual satisfaction before and after undergoing treatment for breast cancer.

Focus Groups. Two focus groups will be conducted, using extended focus group methodology with pre- and post-test measures. Each group will consist of 6-8 African American women selected from breast cancer support groups, breast treatment centers, community centers, womens' groups, churches, and the

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African American community-at-large (n=12-16). The groups will be homogeneous for age - one for ages 35-45 years, and one for ages 46 years and older. The focus groups will be convened at venues and times convenient for the respective target groups. Focus group participants will be provided with refreshments, and they will receive a \$20 cash incentive in exchange for their participation. The proceedings of the focus groups will be audiotaped, transcribed, and content coded. Information gathered from the focus groups will be used to inform the content and scope of the surveys.

The focus group discussions will provide an opportunity to explore and compare the experiences of breast cancer survivors for the personal significance of their breasts, definition of femininity, gender roles, factors involved in breast cancer treatment, response of sex partner(s) to cancer diagnosis and treatment side effects, post-treatment changes in body image, sexuality, and sexual functioning, expectations of health care providers in preparing women for the sexual side effects of breast cancer, and generate suggestions for educational materials and strategies. The focus groups will also be used to assess the cultural and linguistic appropriateness of existing scales that have traditionally been used to assess posttreatment sexual functioning among Anglo women.

Women will be asked to complete a short, self-administered survey at the beginning of the focus group to assess demographics, breast cancer knowledge, attitudes, beliefs, and behaviors (KABB's), stage of disease, types of treatment, pre/post treatment levels of: sexual activity, sexual practices, and sexual functioning (along the desire, arousal, and release phases of the sexual cycle), and perceived changes in body image. Another survey will be administered at the conclusion of the focus group, which will allow for the evaluation of the focus group, measures changes in breast cancer KABB's, as well as changes in other constructs which may have been facilitated by the focus group process.

MEASURES

Self-administered, confidential, mail-in surveys will be used to collect data from the breast cancer survivors. Each eligible woman will be mailed a study packet containing a one-page description of the study, one survey, and two consent forms signed by the PI (one for their records and one to be signed and returned with the survey). The survey will contain closed-ended items, and it will be designed to require no more than 45 minutes for self-administration. The survey will contain measures reflective of a review of the literature, validated scales, and of the data gathered from focus groups. Upon returning the signed consent form and the survey, each participant will be mailed a \$25-value department store gift certificate. The following is sampling constructs intended for measurement of pre/post changes:

Demographics. Items will measure, at minimum, age, marital status, educational attainment, employment status, annual income, number of children, number of rooms in house, and group memberships.

History of breast cancer. Items will assess date of diagnosis, date of first treatment, treatment regimen, perceived outcome of the treatment, the number of close associates and/or relatives with breast cancer, and frequencies of BSE, CBE, and mammograms.

Reproductive History. Items will assess the woman's use of contraceptives, number of pregnancies, age at first pregnancy, number of children, age of menses, history of sexually transmitted diseases, and post-treatment changes in vaginal physiology (eg, dryness, atrophy, dyspareunia).

Sexual Practices. The Sexual Activities Scale from the Derogatis Sexual Functioning Inventory³⁹ will be used to assess the range and frequency of sexual activities.

Sexual Response Cycle. A combination of items from the Sexual Arousal Inventory,⁴⁰ the Heterosexual Behavior Hierarchy-Female Form,⁴¹ and items from Masters and & Johnson's survey⁴² will be used to assess the changes in each of the three separate phases of the sexual response cycle.

Sexual Satisfaction-Global Sexual Evaluation. The items from Andersen and Jochimsen's GLOBE scale²⁰ will be used to assess overall perception of and level of satisfaction with sexual life.

Body Image. Derogatis & Melisaratos's Body Image Scale³⁹ will be used to assess the woman's beliefs about her body and appearance.

Pre-treatment preparation by health care provider. Items will be developed to assess the woman's perception

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of her provider's effectiveness in preparing her for the general and sexual side effects of her cancer treatment.

Perceived Support from Sex Partner. Items will be generated to assess the extent to which the women felt that they could rely on their partners for emotional and physical support.

Marital Adjustment. Selected items from Spanier's Dyadic Adjustment Scale⁴³ will be used to assess areas of possible disagreement, satisfaction, and a global evaluation of the relationship with sex partner.

Self-Esteem. Rosenberg's Self-Esteem Scale⁴⁴ will be used to evaluate self esteem.

Coping Skills. Lazarus's Revised Ways of Coping Scale⁴⁵ will be used to assess the repertoire of coping strategies utilized.

LIMITATIONS OF STUDY

There are at least three limitations of this study. First, cross-sectional data has limited generalizeability and cannot be used to imply causality.

A second limitation involves selection bias in the selection of participants from clinic rosters, and in those women who refuse to participate. The women not selected for participation or who refuse to participate in the study may have a greater change in their pre/post treatment levels of sexual functioning.

The third limitation involves recall bias. Women will be asked to recall their premorbid levels of sexual functioning which creates a problem for the validity of the responses.

SIGNIFICANCE OF STUDY

For rehabilitation to be complete in a cured cancer patient, or for therapy to be fully comprehensible beyond cure, it is essential that attention be devoted to the problems associated with the sexual dysfunction that arise out of cancer therapy. Findings from this behavioral research study will inform the medical and scientific communities about unique expression of breast cancer treatment-induced sexual side effects among African American female patients. In addition, the study will generate pilot data on which larger, prospective studies can be developed. Also, the data collected will inform the framework for the future development of pilot interventions to educate African American breast cancer patients and their providers about such treatment-induced side effects.

DATA MANAGEMENT

Confidentiality. In order to insure for confidentiality, each participant will be assigned a unique identifier. The identifier for the breast cancer survivor will be composed of a 9-digit number representing the last, middle and first initials of the subject's name, and the subject's date of diagnosis. The unique identifiers will be appended to all data collection materials, including, the consent forms, the biographical data sheets and the survey. No other identifying information will be appended to the data collection materials. Data will be kept in a locked storage file located in the locked office of the investigators. Data will only be accessible to the investigators. Data will be analyzed and reported in aggregate form; no data will be reported individually.

DATA ANALYSIS

A codebook will be created by the investigator to assist in post-coding of survey responses, as necessary. All surveys will be reviewed for completeness by study personnel, immediately upon their receipt. Data will be cleaned, and all data entry and analyses will be performed using SAS for Windows, version 6.1. Items and scales will be analyzed qualitatively (focus groups) and quantitatively. Psychometric analyses will be performed to assess the reliability and validity of the interview instrument. Univariate analyses will be performed to obtain a preliminary descriptive analysis. Analyses of association will be performed to determine association between the independent and outcome variables, the independent and mediating variables, and the mediating and outcome variables. T-tests will be used to measure the mean percentage change in items measuring pre/post sexual satisfaction and functioning, and to test for differences in refusers

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versus volunteers. Analyses will be controlled for age, marital status, stage of disease, and length of time since treatment. Indices of some of the constructs will be created, whenever possible. Univariate and multivariate logistic regression analyses will be used to evaluate the predictive value of the different breast cancer treatments for sexual side effects, and to test the effects of the hypothesized mediators on the relationship between treatment and sexual side effects.

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APPENDIX E

INTRODUCTION

Breast cancer is the most common invasive malignant condition affecting women in the United States and the second leading cause of cancer-related deaths (1- 6). Since 1988, breast cancer has been the leading cause of death in the United States for women between 40 and 55 years of age (7). One out of every eight (nine) women will develop breast cancer at some point in their lifetime (8 and 9). Whereas breast cancer has been extensively reviewed in the literature, there remains a paucity of literature addressing the incidence, mortality, treatment/management, survival, and quality of life exclusively in African American women (10 and 11).

Incidence. There has been a steady increase in the rate of breast cancer cases since 1950, with a sharp rise in the mid-1980s partially because of the increased use of mammography (2 and 4). The annual incidence of breast cancer among women increased approximately 52% during 1950 to 1990 (1). In 1996, a total of 184,300 new cases were projected (5). Table 1 shows breast cancer incidence specifically in the decades from 1970 to 1990. Since 1970, the incidence rate has increased by 117% (2). As reported by Sondik (1994), the incidence has been increasing on an average of 1% annually. In 1970, the incidence rate was 79.9%, with 69,000 new cases diagnosed. In 1980, the incidence rate was 85.2%, with 109,000 new cases diagnosed. In 1990, the incidence rate was 102%, with 150,000 new cases diagnosed.

Although a single incidence rate combining all age groups is indicative of the overall impact of the disease, it is instructive also to consider age-specific trends (2). The

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increase in the incidence rate was nearly 40% for women aged 65 years and older (≥ 65), whereas the increase was less than 5% for women younger than 50 years (2).

Breast cancer incidence varies not only by age but also by race. African Americans and whites have very different cancer incidence rates for a number of anatomic sites (2 and 12). For many sites (e.g., cervix, esophagus, larynx, male lung, multiple myeloma, pancreas, prostate, stomach, colorectum, and oropharynx), African American rates are higher than those of whites (7 and 12). For smaller number of sites (e.g., bladder, breast, ovary, rectum, uterine corpus), African American rates are lower than those of whites (7 and 12). With respect to breast carcinoma, specifically, African American women aged 40 and older have a lower incidence rate, and those younger than 40 have a higher one as compared to white women. As the incidence of breast cancer in young African American women has increased faster than the incidence of young white women, the age at which the crossover in incidence occurs has gradually increased over the past 20 years and is now between 45 and 49 years of age (4).

The causes of these racial differences have not been clearly shown, however, several lines of evidence support the belief that a large factor is socioeconomic status (SES) (4 and 12). In addition, reproductive patterns (13 - 15), hormones (16 - 19), lifestyle (20 and 21), age (22), proximity or contact with pesticides (23), diet (24), and genetic susceptibility (25 and 26) have been investigated as possible explanations for the racial variation.

Mortality. The number of deaths from breast cancer over the past two decades, specifically from 1970 to 1990 have increased by nearly 50% (2). In 1996, 44, 300

deaths from invasive breast cancer are projected among women (5). Table 1 summarizes the mortality rate during this period. In 1970, the mortality rate was 26.6%, with 30,000 deaths reported. In 1980, the mortality rate was 26.4%, with 36,000 deaths reported. In 1990, the mortality rate was 27.3%, with 44,000 deaths reported.

As mentioned earlier, breast cancer incidence, as well as mortality, varies by age and race. The death rate from breast cancer is approximately three times higher among women aged 65 and older than among women aged 35 to 64 years (27).

The mortality burden of breast cancer in the African American population in the United States is disproportionately greater than that in the white population. From 1973 to 1989, there was an 11.4% decrease in mortality for women younger than 50 years (2). This contrast with an increase of 5.3% for women aged 50 years and older. Among African American women, no decrease was evident for any of these aged groups. More specifically, for white women, there was a 13.2% decrease for women younger than 50 years vs. an increase of 3.4% in African American women. For women aged 50 years and older, there was a 4.7% increase in the white population vs. an increase of 20.3% in the African American population (see Table 2).

Reasons for higher mortality relative to incidence for African Americans may be due to: lower rates of early detection and poor access to state-of-the-art medical care.

Treatment/Management. Prior to 1990, a diagnosis of breast cancer usually meant that a mastectomy would be performed, most frequently the Halstead-Radical Mastectomy (28). Breast conservation treatment was rarely performed in the 1980s, and the medical establishment has considerable doubt about the survival

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equivalency of treatment with mastectomy versus breast conservation surgery followed by radiation therapy (29). The landmark paper published by Fisher, Bauer, Margoless, Poisson, Pilch, Redmond, Fisher, Wolmark, Deutsch, & Montague (1985) [30] established the effectiveness of breast conservation treatment. Today the trend is to utilize less radical surgeries including modified mastectomy, and simple mastectomy and lumpectomy (31 and 32). There is also a growing trend for oncologist to recommend adjuvant therapy in the form of postsurgical courses of radiation, chemotherapy, and/or the long-term administration of tamoxifen (Nolvadex) [33]. Cytotoxic chemotherapy and endocrine manipulation have also been used (32, 34 and 35).

Little information is available about treatment patterns in African American women. In 1992, the Black/White Cancer Survival Study Group (36) reported that among women with equivalent cancer stage, African American women were just as likely as white women to have surgical therapy as part of their primary treatment plan. The group found that African American women were less likely to have breast-conserving surgery and more likely to have a modified radical mastectomy.

According to Powell (1974) [37], treatment differences between African American women and white breast cancer patients abound. African American women receive less aggressive therapy even with adjustment for age, stage, and histology (38 and 39). They also spend significantly more days in the hospital, are treated by more medical oncologists than surgeons, receive "less appropriate extent of disease work-ups", and have less access to aftercare or post-mastectomy rehabilitation (38 and 39).

In another study, Freeman & Wasfie (1989) [40] report that in almost two-thirds of

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the African American women with breast cancer, the primary mode of treatment performed was surgery, either in the form of radical or modified radical mastectomy with or without radiotherapy. The 5-year and 10-year survival rates for patients treated surgically were 39% and 27%, respectively, and 31% and 24% survived with no evidence of the disease, respectively. The very low survival rates were compared unfavorably with the 5 year survival rate reported by the National Cancer Institute for both whites (75%) and African Americans (63%).

The use of systemic adjuvant therapy has generally not been found to vary significantly according to race, although the data in this area are limited (36, 39, 41 and 42). Similarly, the Piedmont Oncology Group (43) found that although the response of African American women with metastatic breast cancer to chemotherapy was similar to that of white controls, the survival rate of African American women was significantly shorter.

Comparatively, Freeman and Wasfie (40) reported that African American patients with advanced local or systemic disease treated with radiotherapy and/or chemotherapy without surgery, 91% died within the first five years.

The previously described differences in breast cancer treatment in African American women may contribute to the disparity in survival rates. A special report by the American Cancer Society (44) concluded that there is a 10% to 15% lower survival in poor Americans, by they African American or white, who develop cancer compared to the middle class and affluent. The report indicated that poor Americans typically are less educated, undernourished, tend to have risk-promoting lifestyles, and have less

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access to the health care system. These factors lead to late diagnosis and ultimately decreased cancer survival. The American Cancer Society report further concluded that African American and white differences in cancer survival are primarily related to SES variables.

Breast carcinomas in African American women are consistently diagnosed at a more advanced stage of disease. As a result, African American women are referred more often than not for aggressive therapies. The discrepancy in treatment modality and survival rate between African American and white women may exist because African American women do have tumors that are more advanced at the time of diagnosis, because tumor biology in African American women is different from that in white women and because of SES factors.

Survival. The data from 1974 to 1988 shows an increase in survival in whites of approximately 75 to nearly 80%, with essentially no net change in African Americans (62.9% to 62.1%) [2]. Survival for African Americans remains poor relative to that for whites, with a 5-year disease-specific survival rate of only 62% compared with 80% for whites (2 and 4).

The discrepancy in survival rate between African American women and white women exists because (i.) African American women have tumors that are more advanced at the time of diagnosis, and (ii.) because tumor biology in African American women is different from that in white women.

i. Large population-based studies have repeatedly shown that African American women have breast tumors at a more advanced stage at the time of

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diagnosis (4, 6, 10, and 45). African American women have larger primary tumors, a higher incidence of spread to the axillary lymph nodes, and more distant metastatic disease than white women (42, 46 - 52).

li. With respect to hormone receptor content of breast carcinoma tumor cells, some studies have found differences in estrogen receptor content (ER) and progesterone receptor content (PgR) between African American patients and white patients (52 - 54). Investigators have found a higher frequency of hormone receptor negative tumors in African American women (42, 47, 50, and 53). Similarly, African American patients less frequently have ER and PgR positive tumors. Because postmenopausal women are more likely to have hormone receptor positive tumors, examination of this factor still shows a persistent difference in hormone receptor levels between African American women and white women when they are separated by menopausal status (47). Both premenopausal and postmenopausal African American women have a lower frequency of ER positive tumors than do corresponding white women.

The results of the investigation by Dignam et. al (1997) differ in that significant differences in outcomes between African Americans and whites were not noted.

Risk Factors. Although various risk factors have been identified as causes of breast cancer, the fact remains that in 75% of all breast cancer no identified risk factor can be found (55). Late age at first birth (56), nulliparity (56), early age at menarche (10 and 56), late age at menopause (10 and 56), family history of breast cancer (4 and 10), high socio-economic status (10), various fertility and reproductive

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measurements (4), and presence or absence of certain benign breast diseases are a few of the known risk factors that have been identified in the white population ().

With respect to risk factors for breast cancer in African American women, three reports have been published that examined risk factors for the development of breast cancer in African American women (57 - 59). Overall, similarities exist to those in the general population: * late age at first full-term pregnancy (In African American women,

the age at first full-term pregnancy is consistently about two (2) years less) [60];

* nulliparity;

* early age at menarche (The median age at menarche is slightly lower in African American girls than in white girls: 12.5 years compared with 12.8 years) [61];

* late age at menopause (African American women have an earlier median age of natural menopause: 49.3 years compared with 50.0 years in white women) [62];

* history of breast cancer in first degree relatives

* prolonged (> 10 years) use of oral contraceptives; and

* history of benign breast disease

Higher level of education and higher socioeconomic status - characteristics identified as associated with elevated risk for breast cancer in the general population - have not been consistently documented to alter risk in African American women (12).

Quality of Life. The diagnoses of cancer and its treatment can have a

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deleterious impact on the quality of a person's life. To date, there is not complete agreement over what constitutes the dimensions of quality of life (QOL). It's one of those terms that is often used but rarely defined. It is too broad and inclusive to be meaningful, It is operationally defined in very different ways by different investigators leading to measures of different things (63). It can mean different things to different people in different contexts (64).

Two definitions of quality of life reflect current notions of the meaning of this construct. An international group of investigators working under the auspices of the Division of Mental Health of the World Health Organization defined quality of life as "an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns" (65). These investigators define six broad domains of quality of life: physical health, psychologic state, levels of independence, social relationships, environmental features, and spiritual concerns. This definition reflects the view that quality of life refers to a subjective evaluation, which is embedded in a cultural, social, and environmental context.

At a U.S.P.H.S. National Institutes of Health Workshop on Quality of Life Assessment, a group of scientists agreed that a concise, clearly stated, operational definition of Health Related Quality of Life (HQOL) was preferable to a global definition (65). At this workshop a working definition was adopted. "Health-related quality of life is the value assigned to duration of life as modified by the impairments, functional states, perceptions, and social opportunities influenced by disease, injury, treatment or policy"

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(66).

Quality of life, therefore, is subjective, a continuous variable, a multidimensional construct that is generally accepted to include several important domains, and health-related; 'it is an ongoing response to events affecting the patient' (67). The domains have included: functional status (performance of self-care activities, mobility, physical activities, and role activities such as work or household responsibilities); disease and treatment-related symptoms (specific symptoms from the disease such as pain or shortness of breath, or side effects of drug therapy); psychological functioning, and social functioning (67). Additional considerations in the evaluation of quality of life have included: spiritual or existential concerns, sexual functioning or body image, and satisfaction with health care.

Cancer survivors have increased the demand for attention to quality of life issues. As the number of survivors of breast cancer continues to rise (currently there are over 1,700,000 women living with breast cancer) so must our knowledge about unique QOL concerns (69). While the literature is extensive with respect to QOL in general, little research has been conducted to describe or test interventions to improve QOL in women who have survived breast cancer.

According to a few investigators (70), the majority of breast cancer survivors 'get on with life' and are even thriving. However, unfortunately some survivors continue to be troubled by problems related to breast cancer and therapy even years after treatment (69).

Several conceptualization models (71 - 74) have been developed to address

the deficit in the literature concerning the QOL of long term breast cancer survivors. Ferrell, Hassey-Dow, & Grant (1995) [71] investigated a QOL model adapted for cancer survivors. The QOL model has evolved over ten years of research and has been tested in several studies of cancer patients. This holistic framework delineates four domains: physical, psychological, social, and spiritual. Padilla, Ferrell, Grant, and Rhiner (1990) [72] derived three categories of attributes embracing quality of life: physical well-being, psychological well-being, and interpersonal well-being. Ferrans (1990) [73] conceptualized QOL as a multidimensional construct composed of four interrelated and overlapping domains: health and functioning, psychological/spiritual, family, and social and economic. As reported in Wyatt, Kurtz, & Liken (1993) [74], other models have included five concepts such as: physical, psychosocial, medical interaction, marital issues, and sexual issues.

Purpose. To validate a quality of life measure with an African American population.

Despite the surge of research taking place to fill the void between the QOL construct and breast cancer survivors, rarely has one utilized a representative sample of African American women. Kagawa-Singer (75) questions the validity of Euro-American quality of life instruments applied to non-Euro-American populations. She warns that measurements of items that have no conceptual equivalency in another culture are invalid.

It is imperative that future research from this point forward utilize valid and reliable instruments that have utilized extensively with an African American population.

BODY

Quality of Life Measures and Breast Cancer. Extensive research efforts have produced a number of validated instruments that can be used to assess quality of life. Over the last decade, considerable effort has been put into developing instruments that produce valid and reliable measures of QOL (76 - 79). Numerous reports of the FACT-B, FLIC, QOL Index, and EORTC QLQ-C30 affirm the validity of each instrument, with a predominantly white population. Table 3 lists some of the instruments that have been used to evaluate quality of life in patients with breast cancer.

Due to the ease of administration and brevity, the FACT-B and the QOL Index will be utilized in this study

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METHODOLOGY

Sample. African American women with breast cancer who are or have been in a support group or focus group within the Southern California region.

Instruments. Three instruments will be included: a demographic tool to describe the sample and to determine treatment characteristics, the FACT-B, and the QOL Index tool.

Data analysis. Analysis of the demographic data will include descriptive statistics. Analysis of the FACT-B and QOL Index will include correlations and analysis of variance (ANOVA).

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Table 1.

Magnitude of the Breast Cancer Problem: 1970 to 1990(2)

Year and percentage change	Cases	Deaths	Incidence rate	Mortality rate
1970	69,000	30,000	79.9	26.6
1980	109,000	36,000	85.2	26.4
1990	150,000	44,000	102.0	27.3
Percentage change	117.4	46.7	27.7	2.6

Table 2.

Percentage Change in Breast Cancer Incidence and Mortality Rates for African American and White Women, 1973 - 1989.(2)

Race	<u>Incidence (age)</u>			<u>Mortality (age)</u>		
	< 50	50+	All ages	<50	50+	All ages
Whites	16.1	36.9	30.0	-13.2	4.7	1.5
African American	19.3	31.0	27.6	3.4	20.3	15.6
All races	9.3	34.7	28.0	-11.4	5.3	2.2

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Table 3.

Quality of Life Measurement Tools

General	Cancer Specific	Breast Specific
Short-form Health Survey: Medical Outcomes Study	Functional Living Index - Cancer (FLIC)	Breast Cancer Chemo- therapy Questionnaire
McMaster Health Index Questionnaire	Functional Assessment of Cancer Therapy (FACT-G)	Functional Assessment of Cancer Therapy - Breast (FACT-B)
Psychosocial Adjustment to Illness Scale	Cancer Rehabilitation Evaluation System (CARES)	Quality of Life - Breast Cancer Version
	EORTC Core Quality of Life (EORTC QLQ-C30)	
	Quality of Life - Cancer Survivors	
	Quality of Life Index for Patients with Cancer (QOL Index)	
	Rotterdam Symptom Checklist (RSCL)	

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APPENDIX F1

**Cancer Rate Differentials Between Blacks
and
Whites of Three Metropolitan Areas: A Ten Year Comparison**

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Ten years ago, Haynes et al. (1) published a paper addressing the cancer incidence and mortality rate differentials between blacks and whites in three cities, Los Angeles, Atlanta, and Nashville. The purpose of that study was to compare incidence, mortality and survival of blacks and whites in the three metropolitan areas. These cities were chosen because they are the service areas of the Drew-Meharry-Morehouse Consortium Cancer Center, which focuses on the prevention and control of cancers among African-American people. The current paper also chooses these three cities for comparison with the previous study (1).

Ten years have passed. Over this ten-year period, it is appropriate to determine what has happened to the excess risk of cancer among blacks in the United States. Black men continue to have the highest overall cancer incidence and mortality rates, largely due to excesses of prostate and lung cancers (2). While the overall cancer incidence rate among women is higher in non-Hispanic whites, nevertheless, the excess risk of cancer mortality among black women still exists. Indeed, among both male and female blacks, there is an excess mortality over that of their white counterparts. However, no comparisons have been made between the excess risks over time. Also, while white women still have an excess incidence of breast cancer, black women have had a more rapid increase in breast cancer in the past decade (3). The purpose of this paper is to determine the degree of change in excess incidence and mortality rates of black males and females compared to their white counterparts over the past ten years in these three metropolitan areas.

METHODS

The three-city data come from two main sources. The Nashville data were collected from the Tennessee State Department of Health. The Los Angeles and Atlanta data came from the NCI's Surveillance, Epidemiology, and End Results (SEER) Program (4). For comparison with the earlier study (1), the four cancers (lung, prostate, breast and cervix) were selected. The Nashville data were raw data, from which average annual incidence and mortality rates were derived by age and race (white and black) for the years 1989 to 1993. These rates were age-adjusted using the 1970 US population as the standard population in order to make comparisons with the data from SEER. The

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Nashville data were conformed to match the SEER data which were all presented as five-year (1989-1993) average annual age-adjusted rates. The percentage change of age-adjusted incidence and mortality rates are calculated for blacks and whites to compare the rates of change between them. Finally, the relative risks of cancer over the ten year period are compared to estimate the change in black - white risks.

This paper also shows the age-adjusted incidence for the total study population in the SEER program. The SEER program covers about 14% of the overall U.S. population. The age-adjusted mortality rates for the total U.S. population come from the National Center for Health Statistics (NCHS). The 1970 US population was used as the standard population for the present study. The 1980 US population was used as the standard population for the previous study. However, it was determined that the distributions of the two populations by age are not significantly different.

RESULTS

Incidence

For the years 1989-1993, Table 1 shows the average annual age-adjusted cancer incidence rates. For lung and prostate cancers, black males had higher rates than white males in all these cities. For cervical cancer, black women had higher rates in Nashville, Atlanta and Los Angeles. For breast cancer, white women had higher average annual age-adjusted incidence than black women in all three cities. The statistical results from the total SEER population also showed higher rate of lung and prostate cancers among black males; and a higher rate of cervical cancer and a lower rate of breast cancer among black females. In Table 3 black/white relative risks are presented. Confidence intervals on the relative risks show that no statistically significant difference between blacks and whites for lung, and prostate cancer in Nashville, and breast and cervical cancers in Los Angeles and Atlanta.

Table 2 presents the percent change in average annual age-adjusted cancer incidence rates between 1979-81 and 1989-93 in Los Angeles and Atlanta. Nashville is not presented because there

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was no incidence data registry until 1987. For lung cancer (Table 2, Figure 1), the data show that white males had a decline in incidence while black males experienced an increase. Los Angeles experienced the greatest relative decline. For prostate cancer (Table 2, Figure 2), both white and black males had increases in incidence in all cities; however, white males had a greater relative increase than black males in each city. For breast cancer (Table 2, Figure 3), although the incidence had risen for both white and black women, black women had a more rapid increase than white women. For cervical cancer (Table 2, Figure 4), both white and black women showed a decline in incidence rates compared to 10 years ago except in Los Angeles where white women showed a 30% relative increase. The percentage changes in age-adjusted incidence of the four cancers among the total SEER population showed the same general trends as the two cities during the past ten years (Table 2, Figures 1, 2, 3, and 4).

Due to the differences in the rates of incidence change over the past ten years, the gap between blacks and whites has also changed. Table 3 shows the cancer relative risks between blacks and whites. The relative risk of having lung cancer increased among black males over the past ten years. Although the relative risks of getting prostate and cervical cancers between blacks and whites decreased in the past decade, blacks still had higher risks of having these two cancers. In Los Angeles and Atlanta, the black/white incidence ratio for breast cancer in years 1989-93 was closer to one (0.87) than ten years ago (0.76), which is a reflection of the fact that in recent years black women have had a more rapid rise in breast cancer incidence than white women in the two cities.

Mortality

Table 4 shows the average annual age-adjusted cancer mortality rates for the years 1989-93. For all four cancers, blacks had higher mortality rates than whites in all three cities (Table 4). For prostate and cervical cancers, black mortality rates were more than twice those of whites. The National data (NCHS) showed similar results (Table 4).

The percentage change in the average age-adjusted mortality rates of the three cities for the years 1979-81 and 1989-93 are presented in Table 5. Lung cancer mortality (Table 5, Figure 5)

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increased among black males but decreased among white males. Prostate cancer mortality (Table 5, Figure 6) rose in both black and white males. Breast cancer mortality (Table 5, Figure 7) increased among black women, especially in Atlanta and Nashville, but decreased among white women in Los Angeles and Atlanta. Cervical cancer mortality (Table 5, Figure 8) decreased in white and black women in three cities except for Nashville black women, who had an increased risk of deaths from cervical cancer. The NCHS data also showed similar trends in mortality (Table 5, Figures 5, 6, 7, and 8).

Compared with the previous ten years, almost all the relative risks of death from cancers between blacks and whites increased except for prostate cancer in Los Angeles and from cervical cancer in Los Angeles and Atlanta (Table 6). In general, in the three cities, blacks still had a higher risk of deaths from all four kinds of cancers. The NCHS data also demonstrated similar trends.

DISCUSSION

Ten years ago, the Drew/Meharry/Morehouse Consortium Cancer Center studied lung, prostate, breast, and cervical cancer incidence and mortality rate differentials between blacks and whites of three metropolitan areas. Their findings revealed excess incidence and mortality rates among blacks compared with whites. The study was done to define regional cancer needs in order to develop appropriate interventions to reduce the excess cancer risks in blacks. While the excess deaths have decreased for some cancers (cervical), the excess rates for most of the other cancers have continued to increase.

Cervical

The relative risk of having cervical cancer between black and white females decreased by about 40% in Los Angeles and approximately 20% in Atlanta (Table 3). The SEER data also showed an approximately 30% decline in the relative risk of cervical cancer between black and white women during the same period (Table 3).

In the past decade, the age-adjusted incidence of cervical cancer declined among black

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women in Los Angeles and in Atlanta. Among white women the incidence increased in Los Angeles and declined in Atlanta. Ten years ago, black women's risk of having cervical cancer was almost double that of white women (Table 3). But during the years 1989-93, the relative risk between black and white women decreased to 1.08 in Los Angeles, and to 1.65 in Atlanta, and was 2.10 in Nashville. The main reason is that black women's incidence of cervical cancer declined more quickly than white women in Los Angeles and Atlanta (Table 3), and probably in the whole country based on the SEER data. In the United States both incidence and mortality for invasive cervical cancer have declined about 40% since the early 1970s (4). SEER data showed that the age-adjusted incidence declined about 38% among black women and about 9% among white women (Table 2).

The observed decline in cervical cancer incidence and mortality in both black and white women is probably due to the increased use of Pap smears in both groups (8). Previously black women and other "high risk" groups have underutilized preventive health services including Pap smears (MMWR, ? 1987). Black women experienced a greater decline in their rates compared to whites due to their greater change in screening behavior during the past decade (8). National data (NCHS) over the past decade show that older women and black women have had the largest increases in Pap smear utilization, the results of which may only now have become apparent (8). Some of these changes may be due in part to secular changes as well as intervention efforts initiated within these communities. While the general trend is encouraging, it is of concern that there was an increase in cervical cancer mortality within one of the metropolitan areas (Nashville) and an increase in incidence in another (Los Angeles). Appropriate studies using state data will be initiated to determine the reasons for the findings and to subsequently develop appropriate effective interventions.

Lung

Over the ten year period examined, there has been an increase in lung cancer incidence among black males and a decrease among white males. Incidence data for Los Angeles show a larger decline (15.3%). Mortality rates for lung cancer decreased in white males but increased in blacks in the Metropolitan areas. National Statistics (NCHS) indicate a modest increase in mortality

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for white males but a large increase (14.6%) for black males. It is well known that smoking accounts for approximately 90% of all lung cancer and passive smoking contributes to lung cancer in non smokers (5). These results also support the fact that black males have different smoking habits and participate in smoking cessation programs to a lesser degree than do their white counterparts (?). The results also suggest that smoking prevention and cessation programs may have been successful among white males and that such programs may have been less successful among black males. These findings indicate a need for more culturally sensitive interventions targeted at black males.

Breast

Breast cancer is the most common non-skin cancer among women in the United States. Our results mirror national trends in which incidence rates have risen for the past two decades (4). The incidence rate for black females, however, show a greater rate of increase than whites, 35.3 vs 31.8% respectively (Table 2). In addition, this increase in recent years is mainly reflected among post-menopausal women (age 50 and older) (4). Consequently the 1989-93 average age-adjusted incidence rates for black women are similar to those of white women.

Should this differential rate of increase continue, in the near future, the annual age-adjusted incidence for breast cancer among black women will inevitably surpass that among white women. A number of studies have suggested that recent increases in breast cancer incidence is mainly due to breast cancer screening and detection (4, 7-11). However, despite a substantial rise in breast screening since 1987, breast clinical examination and mammography are still underutilized by women of older ages, low income levels, lower educational levels, residents of rural areas and those who lack health insurance (7, 11-12). Black women are disproportionately represented among all of these groups. Moreover, there is ample evidence that black women, especially black elderly women utilize breast screening services to a lesser extent than do white women. While there has been an increase in screening behavior of these women, an increase in breast screening alone probably does not explain all of the recent increase in breast cancer incidence among black and white women. The reason for the more rapid incidence increase in black women especially older black women, compared to whites, is unknown and should be an important issue for future investigation.

Prostate

Prostate cancer is the most commonly diagnosed cancer among American men, and Black Americans are known to have the highest rates in the world. In keeping with national statistics, rates from the three metropolitan areas show rising incidence and mortality rates for prostate cancer for both black and white men. Moreover, the gap in the incidence rates between the two races deminished because of a more rapid increase in incidence among white males compared to blacks. However the gap between mortality rates has increased between the two time periods. **According to the data from NCHS, from 1980 to 1990, the age-adjusted mortality rates of prostate cancer increased 23% and 15% among black males and white males, respectively. However, in the early 1990s, the rates began a slight downturn. The reasons for both the rise and fall are unclear because understanding of prostate cancer risk factors is lacking. Medical intervention and management including advances in treatment and possibly the increased use of early detection, are believed to have palyed a role. The increase in prostate cancer mortality between 1980 and 1990 may reflect an "attribution bias", whereby some deaths attributed to prostate cancer would have been assigned to other causes in the absence of widespread screening in the past, particularly among very elderly men.**

The findings in this study show a continuing need to develop and implement culturally sensitive interventions targeting the black population. Reaching the black male for intervention continues to be a major challenge.

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Table 1 Average Annual Age-adjusted Cancer Incidence Rates*
By Sex, Primary Site, Race and Geographic Area (1989-1993)

Geographic Area	Male				Female			
	Lung		Prostate		Breast		Cervix	
	Black	White	Black	White	Black	White	Black	White
Los Angeles	109.9	68.1	198.2	138.0	93.8	107.3	12.6	11.7
Atlanta	121.5	93.9	224.6	168.1	96.4	111.3	12.9	7.8
Nashville	119.7	101.9	142.9	123.2	86.3	114.4	17.4	8.3
SEER (Total)	122.1	79.2	211.7	150.7	97.3	112.8	12.6	7.9

* Incidence Rates: Per 100,000 population.

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Table 2 Relative Risks* of Cancers Between Blacks and Whites

Geographic Area	Male				Female			
	Lung Cancer RR		Prostate Cancer RR		Breast Cancer RR		Cervix Cancer RR	
	79-81	89-93 (95% C.I.)	79-81	89-93 (95% C.I.)	79-81	89-93 (95% C.I.)	79-81	89-93 (95% C.I.)
Los Angeles	1.35	1.61# (1.36-1.93)	1.66	1.44# (1.27-1.63)	0.76	0.87 (0.74-1.03)	1.82	1.08 (0.68-1.70)
Atlanta	1.14	1.29# (1.11-1.51)	1.65	1.34# (1.19-1.50)	0.76	0.87 (0.74-1.01)	2.04	1.65 (0.67-3.92)
Nashville	-	1.18 (0.99-1.36)	-	1.16 (0.99-1.33)	-	0.75# (0.64-0.89)	-	2.10# (1.01-4.92)
SEER (Total)	1.47	1.54	1.60	1.41	0.84	0.86	2.30	1.59

* Relative Risk = Black to white ratio of average annual age-adjusted incidence rates.

Statistically significant.

The 79-81 data and SEER data did not have statistical tests for above RRs .

Table 3 Percentage Change in Annual Average Age-adjusted Cancer Incidence Rates Between 1979-81 and 1989-93

Geographic Area	Male				Female			
	Lung		Prostate		Breast		Cervix	
	Black	White	Black	White	Black	White	Black	White
Los Angeles	1.7	-15.3	65.7	91.1	25.7	9.0	-23.2	30.0
Atlanta	9.8	-3.2	79.8	121.5	46.5	29.4	-35.5	-20.4
SEER (Total)	2.6	-2.2	76.0	100.7	35.3	31.8	-37.6	-9.1

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Table 4 Average Annual Age-adjusted Cancer Mortality Rates*
By Sex, Primary Site, Race and Geographic Area (1989-1993)

Geographic Area	Male				Female			
	Lung		Prostate		Breast		Cervix	
	Black	White	Black	White	Black	White	Black	White
Los Angeles	91.8	55.4	45.8	22.5	32.1	27.6	5.2	3.2
Atlanta	106.6	76.3	66.3	26.1	31.3	25.0	5.1	1.7
Nashville	138.7	91.5	67.0	24.8	36.0	25.4	8.9	2.4
NCHS (Total)	104.7	72.0	54.7	24.3	31.3	26.6	6.6	2.5

* Age-adjusted mortality rates: Per 100,000 population.
Standard population for Nashville: 1970 US population.

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Table 5 Percentage Change in Annual Average Age-adjusted Cancer Mortality Rates
Between 1979-81 and 1989-93

Geographic Area	Male				Female			
	Lung		Prostate		Breast		Cervix	
	Black	White	Black	White	Black	White	Black	White
Los Angeles	9.4	-2.2	2.9	17.2	0.6	-13.8	-45.8	-15.8
Atlanta	26.5	-6.8	40.8	23.1	20.4	-3.5	-40.7	-37.0
Nashville	14.6	-1.9	30.6	0.8	22.9	8.5	18.7	-29.4
NCHS (Total)	14.6	3.9	24.6	15.7	19.0	0.0	-25.0	-21.9

Standard population for Nashville: 1970 US population.

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Table 6 Relative Risks* of Deaths From Cancers Between Blacks and Whites

Geographic Area	Male				Female			
	RR of Deaths from Lung Cancer		RR of Deaths from Prostate Cancer		RR of Deaths from Breast Cancer		RR of Deaths from Cervix Cancer	
	79-81	89-93 (95% C.I.)	79-81	89-93 (95% C.I.)	79-81	89-93 (95% C.I.)	79-81	89-93 (95% C.I.)
Los Angeles	1.48	1.66# (1.37-2.01)	2.32	2.04# (1.52-2.72)	1.00	1.16 (0.87-1.56)	2.53	1.63 (0.73-3.63)
Atlanta	1.03	1.40# (1.18-1.67)	2.22	2.54# (1.96-3.30)	1.00	1.25 (0.92-3.30)	3.19	3.00# (1.10-8.17)
Nashville	1.30	1.52# (1.30-1.77)	2.09	2.70# (2.07-3.52)	1.25	1.42# (1.06-1.90)	2.21	3.71# (1.63-8.44)
NCHS (Total)	1.32	1.45	2.09	2.25	0.99	1.18	2.75	2.64

* Relative Risk = Black to white ratio of average annual age-adjusted mortality rates.

Statistically significant.

The 79-81 data and SEER data did not have statistical tests for above RRs .

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APPENDIX F2

Recent Trends and Important Changes in Patterns of Incidence of Breast Cancer among Black and White Women in Tennessee State, 1989-1993

Ling Y. Wu, PhD, MD, Kofi A. Semanya, PhD

Breast cancer is the most common form of cancer among black and white women in the United States. The incidence of breast cancer has been rising for the past two decades (1). Many previous papers suggested that this increase in incidence could be mainly explained by increased screening by physical examination and mammography (2-6). However, screening alone does not seem to explain the fact that the incidence of breast cancer among black women increased more rapidly than white women while the screening prevalence among black women has been lower than white women. According to SEER report (1), in the United States in the past two decades (1973-1993), the incidence of breast cancer increased 36.9% among black women while 24.0% among white women. In recent years, between 1989 and 1993, the incidence of breast cancer increased 8.2% among black women but no increase among white women(1). This increase in recent years mainly reflected among the postmenopausal black women (age 50 and older) because the percentage increase among these women was 11% while young black women only increased by 0.8% (1).

Previous studies found that white women had a higher age-adjusted incidence rate of breast cancer because they had a significant higher incidence rate after age 50 (7-10). SEER reported that the age-adjusted incidence for older white women (> age 50) was always higher than black older women (> age 50) in the past 21 years (1973-1993) (1). However, in recent years, there has been an important trend in incidence of breast cancer, that is, breast cancer incidence among black women increased much rapidly than white women, especially among the older women (age 50 and older) (Table 1). This trend would inevitably result in the change of the pattern of breast cancer incidence between white and black women in the past two decades.

The purpose of this study is to examine the recent trend and change in patterns of breast cancer incidence between white and black women in Tennessee State between 1989 and 1993. The Tennessee Cancer Reporting System allowed us to collect breast cancer incidence data from the whole state and this is the first time in Tennessee history to do this kind of study because no breast cancer incidence data available before 1989.

Table 1 Recent Trends in SEER Breast Cancer Incidence*

Year 1989-1993	White Female			Black Female		
	All ages	<50	50+	All Ages	<50	50+
Percent Change (PC)	0.0	-4.3	1.2	8.2	0.8	11.0
Est. Annual PC (EAPC)	0.0	-1.3	0.4	2.8 ⁺	0.7	3.5 ⁺

* Based on SEER Cancer Statistics Review 1973-1993. National Cancer Institute 1996.

+ the EAPC is significantly different from zero.

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Method

Breast cancer incidence data were collected in Tennessee State between 1989 and 1993. All the data came from the Tennessee State Department of Health. Breast cancer cases were reported from all appropriate Tennessee hospitals to Tennessee Cancer Reporting System which is under the State Department of Health. Population data were provided by the Office of Health Statistics of the Department of Health.

Breast cancer incidence rates were calculated by age and race (white and black) for each year from 1989 to 1993. These rates were also age-adjusted using 1970 US population as standard population. The percentage change of age-adjusted incidence rates are calculated. The Mantel-Haensel chi-square test is used to assess linear trend of age-adjusted incidence rates. For this trend test, the expected number of cases was calculated based on the 1970 standard US population.

Results

The main important changes in breast cancer incidence from 1989 to 1993 were that (1) both the incidences for white and black women increased, and (2) the incidence for black women increased more rapidly than white women, especially after age 50. Figure 1-5 show the incidence for white and black women from year 1989 to 1993. In year 1989 and 1990, the incidence for white women was almost the same as black women before age 50, but significantly higher after age 50. In year 1991, the incidence for white women was higher than black women after age 60. In year 1992, white women had a higher incidence only after age 70. However, in year 1993, the black women began to have a higher incidence before age 55 and after age 75 as well.

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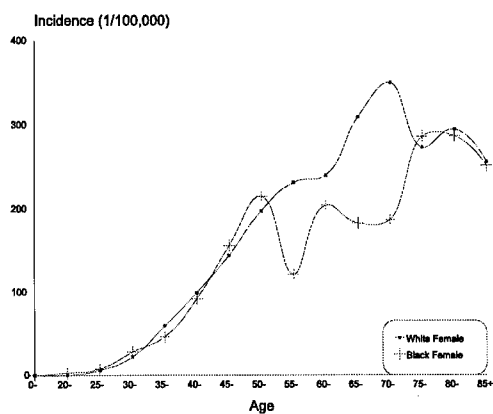


Figure 1 1989 TN State Breast Cancer Incidence

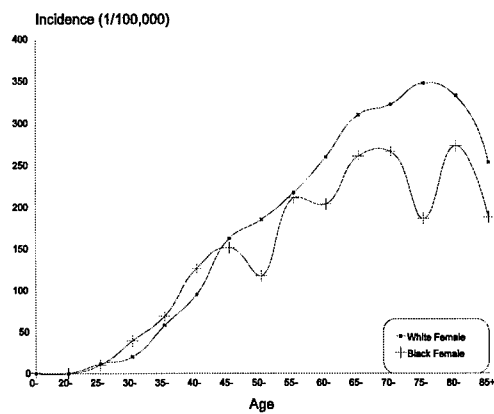


Figure 2 1990 TN State Breast Cancer Incidence

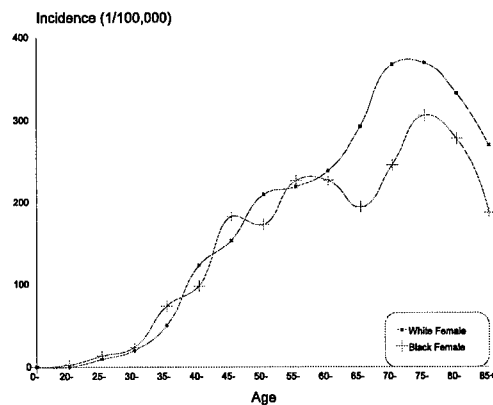


Figure 3 1991 TN State Breast Cancer Incidence

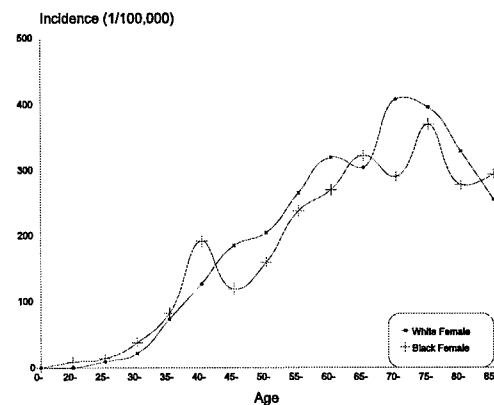


Figure 4 1992 TN State Breast Cancer Incidence

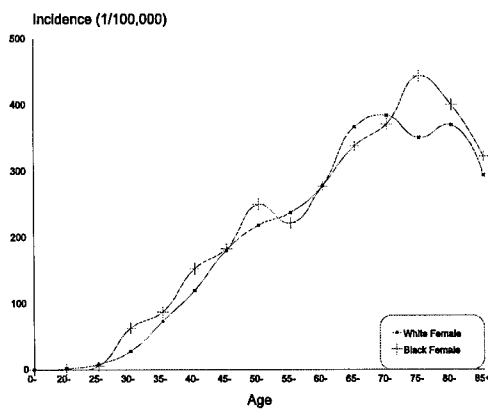


Figure 5 1993 TN State Breast Cancer Incidence

Table 2 shows the age-adjusted incidence rates. For all ages, white women had an increased age-adjusted incidence between year 1989 and 1992, but this rise ceased in year 1993. Black women had a faster increase than white women in each year during this five year period. Before 1993, despite for the faster increase of breast cancer incidence in black women, white women still had a total higher age-adjusted incidence than black women. However, in 1993, black women surpassed the white women in age-adjusted rates, for all ages, before age 50 and after age 50.

Table 2 1989-1993 TN State Age-adjusted Breast Cancer Incidence (1/100,000)

Year	White Female			Black Female		
	All Ages(PC*)	<50(PC*)	50+(PC*)	All Ages(PC*)	<50(PC*)	50+(PC*)
1989	82.1	25.6	256.1	67.7	25.9	196.7
1990	83.7(1.9)	27.0(5.5)	258.7(1.0)	73.0(7.8)	31.0(20.0)	202.5(2.9)
1991	86.0(2.7)	27.8(3.0)	265.3(2.6)	76.9(5.3)	30.7(-1.0)	219.4(8.6)
1992	96.5(12.2)	32.3(16.2)	294.6(11.0)	89.5(16.1)	35.3(15.0)	256.9(17.1)
1993	95.9(-0.6)	32.0(-0.9)	291.0(-1.2)	101.8(13.7)	37.9(7.4)	298.6(16.2)
χ^2 for trend	3554	1709	2025	17777	3824	14099
p value	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001	<0.000001
PC, 1989-93**	16.8	25.0	13.6	50.4	46.3	51.8

* PC: Percentage change compared with last year.

** PC, 1989-93: Percentage change between 1989 and 1993.

Discussion

In the Tennessee State literature, the first time black women had a higher age-adjusted breast cancer incidence than white women in 1993. This is not surprising because from 1989, maybe earlier (no data before 1989 in TN State), black women had a much more rapid increase than white women and this increase occurred mainly after age 50.

Previous studies on breast cancer incidence in 1980's suggested that the total age-adjusted incidence among white women was consistently higher than black women during the last two decade (1). However, this rise was not uniform among all age groups but followed a crossover pattern in which the incidence at young ages was slightly but consistently higher in the black women while the risk in the middle-aged and especially in the elderly population was substantially higher among white women (14). Previous studies also reported that as the incidence of breast cancer in young black women increased faster than white women, the age at which the crossover in incidence occurred had gradually increased over the past 20 years (1, 14).

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Many previous studies suggested that recent increase in breast cancer incidence was mainly due to the increase of breast screening. However, despite the substantial rise in breast screening since 1987, clinical examination and mammography have still been underutilized among the women at old ages, low income level, low education level, rural residence, and lack of health insurance (8, 14). These factors are particularly important for black women because they are disproportionately represented in these groups. There has been no evidence that black women, especially among the older women, have a higher breast screening prevalence than white women. Therefore, increase in breast screening alone can not explain recent changes in breast cancer incidence between white and black women.

Because the difference between the annual increase of breast cancer incidence among black women and white women still exists, the trend that the age-adjusted breast cancer incidence of black women, especially old black women, overpasses that of white women will continue.

Previous studies have tried to find the risk factors of breast cancer among black women. However, these risk factors were examined not under the circumstances which allowed to compare the risk factors between white and black women, and therefore, these studies could not explain the fact that why older black women had a more rapid increase in breast cancer incidence than older white women.

Recent changes in the pattern of breast cancer incidence may imply differential distributions of risk factors between black and white women. Future studies may explore the reasons of these changes and prevent the rapid increase in breast cancer incidence, particularly among the older black women.

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APPENDIX G

Estrogen receptor status of breast cancer: a marker of different stages of tumor or different entities of the disease?

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Abstract — Breast cancer can be divided into two types according to the estrogen receptor (ER) level of the tumor: ER-positive and ER-negative. Two hypotheses have been raised about the relationship between ER-positive and ER-negative breast tumors. One hypothesis considers ER status as an indicator of a different stage of the disease. The other regards ER-positive and ER-negative tumors as different entities. For both etiological and biological studies of breast cancer it is important to know which hypothesis is correct. In this paper, we review evidence for and against each hypothesis and suggest issues to be addressed in future studies.

A substantial body of epidemiologic, experimental, and clinical evidence has shown that the effects of estrogens on the growth of breast epithelium influence breast cancer risk (1). Estrogens exert their effects by binding to estrogen receptors (ERs) in breast cells (2). Breast cancer has two subgroups according to ER status: ER-positive and ER-negative. Each subgroup has different biological and clinical attributes (3). Since estrogen stimulates cell proliferation of ER-positive breast cancer cell lines, and may therefore be associated with ER-positive human breast cancers only (2), an elucidation of the relationship between ER-positive and ER-negative cancers would have implications for etiologic studies of the disease.

Two hypotheses about estrogen receptor status

Two hypotheses have been raised about the relationship between ER-positive and ER-negative breast cancers (3,4). One hypothesis suggests that ER status may represent different stages in the disease progress. This hypothesis stipulates that ER-negative breast cancers result from the lost ability to synthesize estrophilin during clonal evolution of estrogen receptors in ER-positive cancers (3,5). The other hypothesis considers ER-positive and ER-negative cancers as different entities. If the former hypothesis is correct, etiologic profiles of ER-positive and ER-negative tumors should be similar. If the latter hypothesis is

true, the risk factor profiles may differ between the two types of breast cancer, especially for hormone-related factors such as nulliparity, age at first full-term pregnancy, age at menarche, and age at menopause.

Evidence for or against each hypothesis

Comparisons of estrogen receptor status according to tumor size and stage

If ER-negativity were associated with larger tumor size and/or later stage of breast cancer, it would support the linkage of estrogen receptor status with the stage of the disease. However, study results have been inconsistent. Some studies suggest that ER-negative status is related to late stage (6,7) or larger tumor size (7,8), while others suggest the opposite (9,10). More studies have actually failed to demonstrate an association between ER and stage or tumor size of the disease (11-18). White et al (19) studied activated and non-activated ERs, and found that activated ERs are not associated with the stage of breast cancer. Using ER mRNA that is closely correlated with estradiol binding activity of ERs, Nagai et al (20) also found that ER mRNA is not related to the clinical stage of the disease or tumor size. However, Pegoraro et al (21) found that, in each racial group (white, black and Asian), very large tumors had fewer ERs, although the stage of the disease was not related to ER status.

These studies have limited implications, because they were based on the comparisons in ER status of different patients with different tumor stage or size rather than the examinations of ER changes among the same patients. Many factors that might be associated with inter-individual differences may have confounded the results.

Comparisons of estrogen receptor level according to tumor progression in the same patients

The most direct way to examine whether ER status is a marker of tumor progression is to follow-up patients' ER status as their tumors develop. Currently available data usually come from clinical studies. In these studies, ERs were compared between primary and recurrent or metastatic breast cancers from the same patients to examine whether ER level in primary tumors is predictive for that in recurrent or metastatic tumors. Because recurrent or subsequent cancers follow primary breast cancer, differences between primary and recurrent/metastatic tumors may represent a sequential change.

Simultaneously obtained specimens from primary and metastatic breast carcinoma have been compared

for ER status (22-31). In general, primary and metastatic (mostly regional lymph nodes) cancers had a high ER status concordance: 85-93% (23,27,28,30). ER values from the primary and remote metastatic sites were also highly correlated (22,24,25,31), with the exception of one study (26). In patients whose ER status was discordant, changes in both directions (ER-positive to ER-negative and ER-negative to ER-positive) were observed (23,27,28,30). While Hoehn et al (22) showed that ER level tended to be higher in metastatic sites, Brankovic-Magic et al (31) and Castagnetta et al (29) found that receptor values were more likely to be lower in metastatic lesions.

ERs from sequential specimens of primary and recurrent/metastatic breast cancers without hormonal therapy have also been compared (23,24,27,28,30-35). ER status in sequential recurrent/metastatic tumors generally had a relatively good agreement with that in primary cancers (23,24,27,28,32,35), although the magnitude of concordance (55-86%) tended to be lower than that for simultaneous specimens. ER levels in primary cancers were also found to be correlated with those in their recurrences and metastases (30-32). The results on discordance have shown both higher (27,28) and lower (30-32) ER levels in recurrent or metastatic lesions, and have also exhibited similar changes from positive to negative and from negative to positive (33,35). In another study comparing the primary tumor and bone metastases, ER levels were significantly lower in the bone metastatic lesions (34).

While temporal change might explain ER discordance between primary and metastatic lesions, other possibilities cannot be excluded. Because ER-negative tumor cells are less differentiated and more aggressive (15,36,37), a selection of ER-negative cells during the development of metastases might produce lower ER levels in metastatic lesions (33). On the other hand, more ERs in metastatic lymph nodes may result from different histologic patterns. Higher cellularity in lymph nodes (31) and higher proportion of connective tissue stroma in primary tumors (25) may lead to more ERs found in metastatic sites. However, cellularity may not entirely account for higher ER level in metastatic lesions, because changes from ER-positive status in primary tumors to ER-negative status in nodal metastases have also been found (30). The transition from ER-negative to ER-positive is inconsistent with the hypothesis of loss of ER as the disease progresses.

Comparisons of ERs in-situ and invasive cancers from the same patients may be less subject to these potential problems. Kobayashi et al (38) found that ER levels were higher for intraductal lesions and lower for invasive components in the same patients.

However, another study, based on in-situ ductal breast carcinoma, showed that the proportion of ER-positive tumors was not higher than that in invasive carcinoma (39).

Studies of risk factors for breast cancer according to estrogen receptor status

If ER status indicates different stages of a tumor, risk factor profiles should be the same between ER-positive and ER-negative tumors. On the contrary, the risk factor profiles may differ if ER status represents two different entities of the disease.

Table 1 summarizes the epidemiological studies on selected risk factors according to ER status (40-46). The results have been relatively consistent for family history of breast cancer, history of benign breast diseases, and parity, and inconsistent for the other factors in the table and dietary factors (41,44,47). The risk associated with family history or benign breast diseases tended to increase for both ER-positive and ER-negative tumors. However, increased risk for nulliparity was more likely seen for ER-positive cancers.

Four (41-44) out of six studies on the relationship between breast cancer and family history of the disease according to estrogen receptor status (41-46) demonstrated that relative risks of family history associated with breast cancer were similar for ER-positive and ER-negative tumors. However, two other studies found that family history is only related to ER-negative cancer (46) or has a stronger asso-

ciation with ER-negative tumors (a relative risk of 5.7 for ER-negative tumors vs 1.8 for ER-positive tumors) (45). Ideally, if ER status can be known from all affected family members, independent linkage analyses can be done to determine if the two ER status cancers have the same genetic mechanism(s). Unfortunately, only one study that we know of has considered this type of analysis (48). This study found that 5 out of 6 characterized patients were ER positive in one family, suggesting the need for more studies.

Most studies have shown a tendency for women with benign breast disease to be at higher risk of developing both ER-positive and ER-negative breast cancers (41-43,45). However, with the exception of Kreiger et al's study (45), increased relative risk did not include unity for only ER-positive tumors (41,43) or ER-negative disease (42). In two other studies (40,44), the risk associated with benign breast disease tended to be lower for ER-negative cancers and higher for ER-positive tumors.

In six of seven studies (40-45), the tendency for nulliparous women to be more likely to develop breast cancer was shown only for ER-positive cancers. This association appeared more obvious among premenopausal women in one study (41). However, almost all confidence intervals of the relative risks in these studies included unity.

Because of a relatively small number of epidemiological studies and possibly insufficient study power in some studies, evidence on the risk factor profile in terms of ER status has been inadequate. The aforementioned studies have not demonstrated consistent

Table 1 Summary of case-control studies on breast cancer according to estrogen receptor status

Author (year)	ER status	Selected risk factors									
		Family history	Parity	Benign breast disease	Age at first birth	Breast feeding	Age at menarche	Menopausal status	Age at menopause	Exogenous estrogen	Body size
Hildreth, et al (1983)	Positive	-	-	+	+	+				-	
	Negative		+	-	-	-				+	
Hislop et al (1986)	Positive	+	-	+	+		-				±
	Negative	+	+	+	NA		±				-*
McTiernan et al (1986)	Positive	+	-	+	+	-*	+		+	+	+
	Negative	+	±	+	±	-	+		+	-	+
Stanford et al (1987)	Positive	+	-	+	+	+		-		-	+
	Negative	+	±	+	+	-		-		+	+
Cooper et al (1989)	Positive	+	-	+	+	NA	NA		+	-	+
	Negative	+	±	-	+	-	-		+	+	±
Kreiger et al (1991)	Positive	+	-	+	-	-	-	-			±
	Negative	+	±	+	-	-	-	-			±
Yoo et al (1993)	Positive	-	NA	-	+	-	+	-	+		
	Negative	+	-		+	-	+	+	NA		

+, positive association; -, negative association; *, confidence interval(s) of the odds ratio(s) does not include one; NA, no association; ±, the odds ratio estimates are not proportional to the exposure levels.

differences in etiologic factors between ER-positive and ER-negative tumors.

Genetic studies on the estrogen receptor gene in relation to estrogen receptor status

The expression of ER phenotype in tumor cells is controlled by the ER gene. There are two possible genetic changes for ER-negative tumors: the loss of ER gene function and the suppression of ER gene expression. The former may result from structural rearrangements, chromosome losses, deletions and point mutations of the gene. The latter may be caused by inadequate activators for ER transcription, excessive transcriptional repressors, and DNA methylation of the gene. Most studies have suggested the latter, showing that the human ER gene is not rearranged or deleted in ER-negative primary breast tumors (49,50) and that point mutations of the ER gene are also very rare in the tumors (51). Mechanisms of any of these genetic changes may be complex. If the changes occur with the progression of tumor, however, it suggests that ER-negative status, the lack of ER gene expression, may be associated with the progression of the disease.

However, studies of ER gene changes and their correspondence to tumor progression have been limited. One study (52) found that lower ER levels are associated with higher rate of rearranged chromosomes, an indicator of tumor evolution or progression. Studies that suggest the suppression of ER gene expression found that DNA methylation of the ER CpG island (cytosine-guanine dinucleotides) in the ER gene might be a mechanism for the suppression of the gene expression in ER-negative breast tumors (53,54). These results were confirmed by the reactivation of ER gene expression by demethylation of the ER gene (55). Suppression of the ER gene by methylation may occur during progression of the disease. In lung and colon cancer, it was found that hyper-

methylation on CpG island increases with progressive tumor stages (56,57) and may be related to increased DNA methyltransferase activity as the tumor progresses (58). If the suppression of the ER gene shares the similar mechanisms, that is, the suppression occurs during progression of breast cancer, ER-negative status may be an indicator of progressive breast cancer.

In summary, previous studies have not provided the consistent evidence to conclude that either hypothesis is correct or even more plausible. Table 2 summarizes previous studies according to study issue, the hypothesis supported if evidence is sufficient, and primary limitations. Excepting these limitations, the difficulties in follow-up of small tumors and biological complexity of ERs in terms of their expression, distribution and variation have further confined our ability to distinguish the two hypotheses.

Future studies

Based on the above discussion, the following issues need to be addressed in future studies:

1. Follow-up of ER changes in tumors: comparisons of ER status between primary and recurrent or metastatic tumors might not lead to a unique explanation of ER changes over time, as mentioned earlier. Sequential examinations of ER levels in a tumor are the best way to observe if ER status changes as the disease develops. While difficulties may exist in obtaining sequential specimens of a tumor without interference from hormonal therapy, this type of study will provide the most direct evidence for or against the hypothesis of different stages.

2. Inclusion of small tumors: In most previous studies ERs were measured by using biochemical assays requiring substantial amounts of breast tissue (10,39). Therefore, small tumors, such as in-situ cancers, have often been excluded (59,60). However,

Table 2 Summary of previous studies according to study issue, hypothesis supported if evidence is sufficient, and study limitations

Study issue	Hypothesis supported if evidence is sufficient	Primary limitations
Patients with larger tumors are more likely to be ER-negative	Different-stage hypothesis	Potential confounding by differences between patients with different stages
Recurrent/metastatic lesions are more likely to be ER-negative than primary tumors	Different-stage hypothesis	Selectivity of ER-negative cells in metastatic sites; Different cellularity between primary and metastatic sites
ER-positive and ER-negative tumors have different risk factor profiles	Different-entity hypothesis	Potential effects of hormonal products on ER status; Possibly insufficient study power
The expression of the ER gene is suppressed with tumor progression	Different-stage hypothesis	Potential effects of hormonal products on the gene

ERs in the small lesions and their changes as the disease progresses to invasive lesion are very important for evaluating whether ER status represents the progress of breast cancer. Immunohistochemical methods that have been recently developed (39) make it possible to measure ERs in small tumors.

3. Evaluation of effects of extraneous hormone: Due to the effect of hormone on ER levels (23,28), recent oral contraceptive (OC) use and estrogen replacement therapy (ERT) may decrease ER level, thereby resulting in the misclassification of ER status. For example, potential differences in risk factor profile between ER-positive and ER-negative tumors would be diluted in case-control studies because some ER-positive patients who have used OC or undergone ERT may be misclassified as ER-negative. In genetic studies, administration of estrogen has also been found to affect transcription and post-transcriptional modification of the ER gene (61). The possible effects should be avoided or evaluated in epidemiological studies and genetic studies in relation to the tumor progression.

4. Consideration of the possible effects of intra-tumor ER heterogeneity: The distribution of ERs is heterogeneous within a single tumor. On one hand, an ER-positive tumor can be falsely regarded as receptor-negative when an ER-negative area is sampled (10). The misclassification in ER status due to sampling errors can attenuate differences in risk factor profiles between ER-positive and ER-negative tumors in case-control studies. The sampling errors in primary and/or metastatic lesions may influence comparisons of ER status between the two sites. On the other hand, the determination of ER status may depend upon not only ER content but also cellularity (59). For instance, ER-positive status may be defined for a highly cellular tumor consisting of cells of low ER content, and ER-negative status may be assigned to a tumor with a very sparse distribution of ER-positive cells in a connective tissue stroma (59). Because of heterogeneity of ER distribution within a tumor and various cellularities between tumors, a more accurate definition of ER-positiveness and negativeness in terms of biological plausibility is desirable.

While efforts are needed to clarify which hypothesis is true, we do not exclude a third possibility: ER status of breast cancer represents neither different stages nor different entities — ER-negative status may be a result of effects of various somatic and extraneous factors after tumor initiation that are not related to the tumor stage. Because ER status of breast cancer represents different survival length and response to hormonal therapy (2), it is desirable to know whether the two types of the tumor are two different

entities and therefore have different biological and etiologic mechanisms.

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